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The Far Eastern Review

ENGINEERING + FINANCE + COMMERCE

THE PIONEER IN ITS FIELD

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CONTENTS:

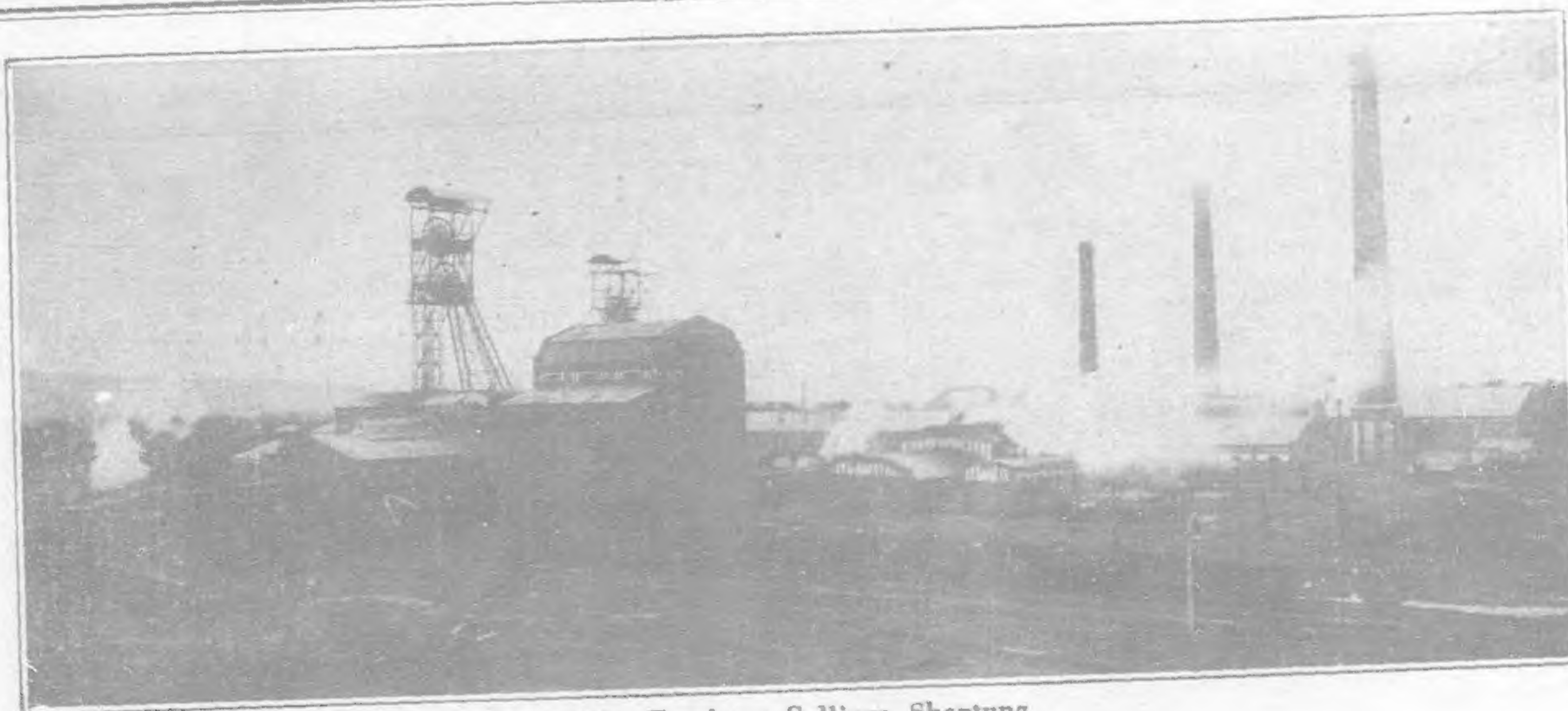
	PAGE		PAGE
AMERICA'S BEST CUSTOMER IN ASIA	601	SIAM'S RICE MILLS	*624
SUN YAT-SEN	603	Chinese Engineering Agency Formed	625
UNIFYING AMERICAN INTERESTS IN CHINA	606	N. E. I. STATE RAILWAYS AND TRAMWAYS	*626
LEONARD WOOD	607	TIN MINES OF THE N. E. I.	*633
Pan-Pacific Conference	608	GREAT WATERWORKS SCHEME FOR HONGKONG	*635
Fuller will Build Dairen Hospital	608	Cost of Building in the Straits Settlements	636
THE DEVELOPMENT OF A GREAT INDUSTRY	*609	LIUCHANG COAL MINES.. .. .	*637
Machine Tools in Chinese Shops	611	THE MASTER AMERICAN BUILDER IN JAPAN	*638
MENACE TO TRAVEL IN MANCHURIA	*612	THE HAN RIVER AND ITS LEVEES	*642
TIENTSIN'S NATIVE INDUSTRIES	*613	MACAO'S BIG HARBOR IMPROVEMENT SCHEME	647
A MODEL POWER PLANT	*617	THE PASSENGER CAR MARKET IN JAPAN	*648
GREATER OSAKA WATER SUPPLY	619	Nobel Industries at the Brazilian Exhibition	653
NORTH BORNEO—A CHINESE COLONY	*620	TOKYO'S NEW HOTEL	*654
Dutch Activities in China	622	THE PROPOSED BRIDGES ACROSS THE YANGTZE AND HAN	
Chinese Cement Factory Proposed	622	RIVERS	*656
RADIO IN CHINA	623	SIAM STATE RAILWAYS' BUILDING PROGRAM	*662

**Illustrated with Maps or Photographs*

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ALPHABETICAL LIST OF ADVERTISERS

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Allen & Co., Ltd., Edgar	14	English Electric Co., Ltd.	13	Kokusai Kisen Kaisha	43	Ryerson & Son, Joseph T.	
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Asbestos Shingle, Slate & Sheathing Co.	17	First National Bank of Boston.	61	Mather and Platt, Ltd.	7	Shanghai Dock & Eng. Co., Ltd.	32
Ashton Frost & Co., Ltd.	19	Fuji Gassed Spinning Co.	10	Matthews & Yates, Ltd.	72	Shanghai Municipal Council	4
Atlantic, Gulf & Pacific Co. of Manila	36			Metropolitan Vickers Electrical Co., Ltd.	75	Shantung Railways	70
Attwater & Sons	48	Gleniffer Motors, Ltd.	15	McClintic-Marshall Products Co.	27	Simons & Co., Ltd., Wm.	14
Avery, Ltd., W. & T.	15	Green Island Cement Co., Ltd., The.	20	McConway and Torley Co.	21	Smith, Major & Stevens, Ltd.	33
		Greenfield Tap & Die Corp.	19	Mitsubishi Bank	59	South Manchuria Railway Co.	64, 68, 69
		Greening & Sons, Ltd., N.	4	Mitsubishi Iron & Steel Co., Ltd.	38	Standard Oil Co. of N. Y.	29
Babcock & Wilcox, Ltd.	31			Mitsubishi Marine & Fire Ins. Co., Ltd.	38	Sulzer Bros.	39
Baldwin Locomotive Works.	65	Hasler Telegraph Works	71	Mitsubishi Shoji Kaisha	18	Sumitomo	58
Bank of Chosen	52	Heap & Co., Ltd., Joshua	51	Mitsubishi Warehouse Co.	38	Sumitomo Bank, Ltd.	58
Bank of Communications	57	Hongkong Rope Manufacturing Co.	20	Mitsubishi Zosen Kaisha, Ltd.	26	Superheater Co., The	71
Banque de l'Indo-Chine	54	Hongkong & Shanghai Banking Cor- poration.	61	Mitsui Bank	59	Thornycroft & Co., John I.	1
Bank of Taiwan, Ltd.	55	Hongkong & Whampoa Dock Co., Ltd.	30	Mitsui Mining Co.	18	Toshin Soko	40
Bliss Co., E. W.	27	Hotel Statler Co.	49	Mitsui Bussan Kaisha	26	Toyo Kisen Kaisha	45
Brill Co., J. G.	39	Humber, Ltd.	42	Motor Rail & Tram Car Co.	41	Transatlantische Handels-Kompag- nie, m.b.h.	72
British-American Tobacco Company (China), Ltd.	62			Mustard & Co.	4	Trimont Manufacturing Co.	9
Brunswick Kroeschell & Co.	71	Imperial Japanese Government Rail- ways	66, 67	New Engineering & Shipbuilding Works.	34	United Brassfounders & Engineers, Ltd.	61
Bucyrus Company	9	Industrial Bank of Japan	56	Nippon Menkwa Kabushiki Kaisha.	50	United Cigarette & Machine Co.	41
Butterfield & Swire	44	International Banking Corporation.	53	Nippon Yusen Kaisha	46, 47	United States Steel Products Com- pany	23, 37, Back Cover
				Nobel Industries, Ltd.	22		
Canada Carbide Co.	15			Okura & Co. (Trading), Ltd.	24	Walworth International Co.	Cover
Chartered Bank of India, Australia & China	48	Japan Sugar Mfg. Co.	6	One Hundredth Bank, Ltd., The.	60	Wharton Jr. & Co. Inc., Wm.	21
Chicago, Milwaukee & St. Paul Railway	39	Jardine, Matheson & Co., Ltd.	12			Whittall & Co., Ltd., J.	6
Clough, S. W.	76	Jones & Lamson Machine Co.	51	Pacific Steamship Co.	41	Wild & Co., M. B.	9
Cole Marchent & Morley, Ltd.	31	Jugo Ginko	54	Pittsburgh Steel Co.	74	Williams & Co., J. H.	7
Craig & Donald, Ltd.	31			Pooley & Son, Ltd., Henry	2		
		Kanegafuchi Spinning Co., Ltd.	10	Republic Truck Sales Corp.	42	Yarrow & Co., Ltd.	Cover
Dai-Ichi Ginko	60	Kawasaki Dockyard Co., Ltd.	35	Royal Bank of Canada	61	Yokohama Dock Co. Ltd.	33
Dai Nippon Brewery Co.	72	Kellogg Switchboard & Supply Co.	63			Yokohama Specie Bank, Ltd.	Cover
Diamond Power Specialty Corporation	63						
Dorman Long & Co., Ltd.	3						
Drewry Car Co., Ltd.	19						
Drysdale & Co., Ltd.	74						



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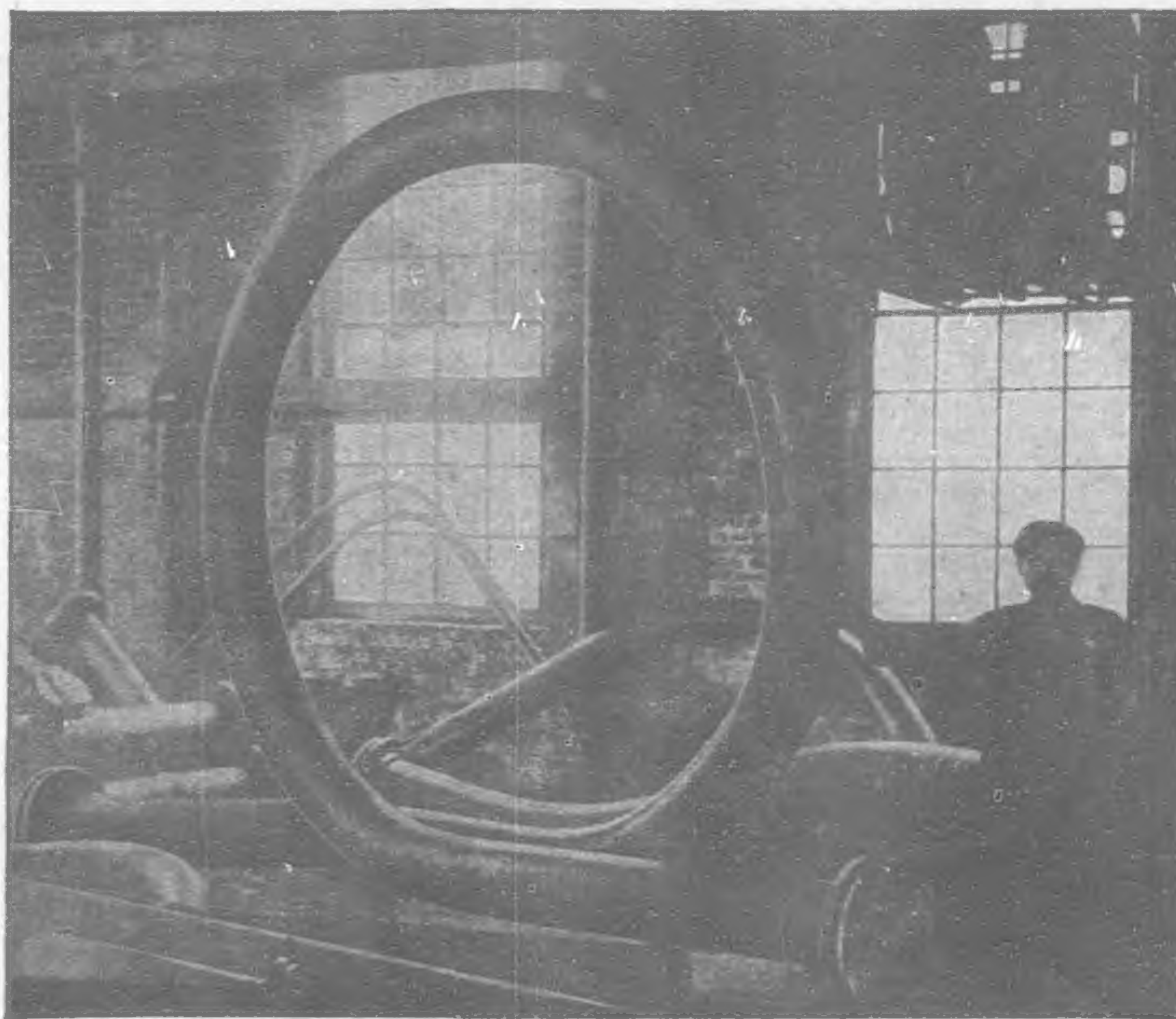
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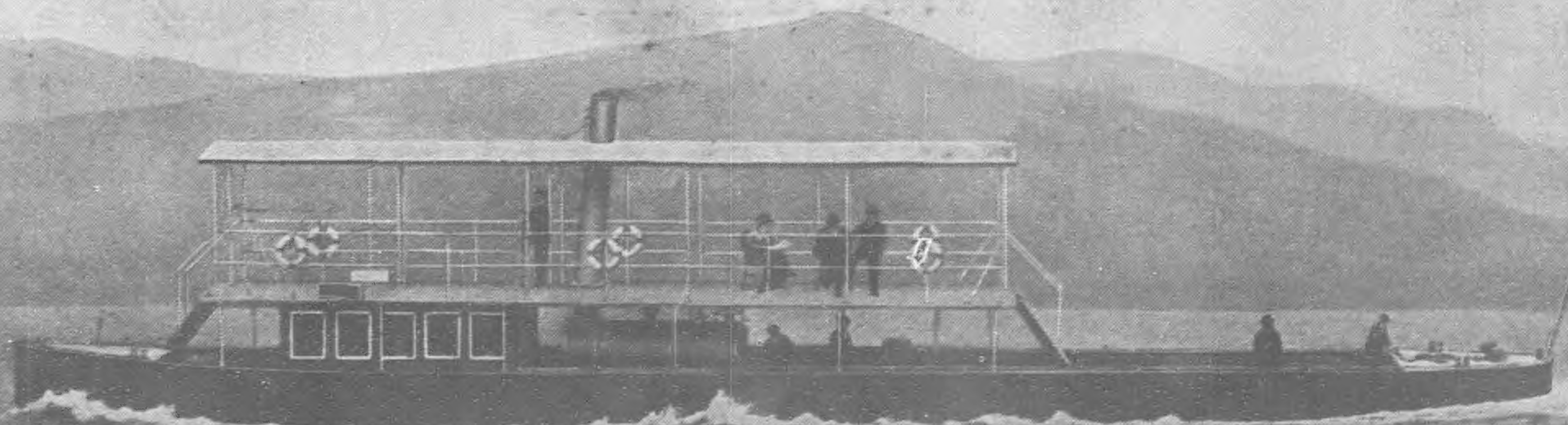
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The Far Eastern Review

ENGINEERING

FINANCE

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VOL. XVIII

SHANGHAI, OCTOBER, 1922

No. 10

America's Best Customer in Asia

PREVIOUS to the Washington conference the efforts of American financiers and business-men to reach a harmonious solution to our differences with Japan were invariably nullified by the counter activities of Americans in China. As often as our leaders of finance and industry succeeded in bridging the gap between the two nations the fruits of their labors were destroyed by renewed agitation against Japan originating in Peking or Shanghai. We thought that these practices had ceased with the signing of the four and nine-power treaties and Japan would be permitted to live up to her pledges without further nagging, but a recent incident discloses that influences are still at work to keep alive suspicions in the minds of Americans against the *bona-fides* of the Japanese government.

A syndicated article appeared recently in several American newspapers from a local correspondent disclosing that the executive committee of the American chamber of commerce at Shanghai had telegraphed the American minister at Peking urging him to carefully scrutinize the progress of the Sino-Japanese Shantung negotiations in order that American trade interests in that province might not be injured, in other words, to see that Japan did not "put over anything" that might close the door to American trade.

Now, THE FAR EASTERN REVIEW is in accord with any measure for the safeguarding of American rights and interests in this country, but we hold firmly to the belief that our national trade in its broader aspects cannot be advanced by continually impugning the motives and good faith of other nations. We are in hearty sympathy with every movement that tends to strengthen our commercial ties with China, but because of present financial and political conditions in this country, for some years to come our actual trade interests in Japan will be many times greater than our prospects in China. It will bring no lasting benefits to our manufacturers for their agents in this country to lend themselves directly or indirectly to keeping alive a propaganda which had its inception under the Wilson administration and received its quietus only when it had brought the nation to the brink of war with Japan. Americans in China should realize the truth of the old adage that the tail cannot wag the dog. The highest officials of our government and the most prominent of our business-men have stretched their hands across the Pacific to clasp those of their colleagues in Japan. The most perfect understanding exists between Hughes and Kato.

Now, Japan may or may not need watching in Shantung, but as far as American trade in general is concerned, it will be well to give careful heed to the trade returns between the two nations. It will give Americans in China something to think over, as it has the more serious minded of their countrymen at home. The recent publication of the trade returns for the fiscal year 1922, has opened the eyes of Americans to the importance of their trade with Japan and from all parts of the country editors are commenting on the surprising facts therein disclosed.

"Who," asks the *Pittsburg Dispatch*, "outside those directly interested, would suppose that the one important country whose trade with us in the past year, imports and exports, increased was Japan? Yet where our world imports show a fall in value of 28 per cent., those from Japan show a gain of 18 per cent., and where our world exports reveal a shrinkage in value of 42 per cent., those to Japan show an increase of 30 per cent. Japan sent us imports practically equal in value to all those from our neighbor, Canada, which led the list of our purchases. Japan was fourth in buying

from us, being exceeded only by the United Kingdom, Canada and Germany; all of which bought less than the previous year, while Japan bought \$59,000,000 more and sold us \$54,000,000, more than in 1921. Our total trade with Japan in 1913 was only \$150,000,000; in the year past it reached \$550,000,000."

"Our imports were mostly raw silks; our exports there were largely raw cotton, but the manufactured articles we are selling the Japanese are rapidly increasing. The figures for 1922 are the more significant, when it is known that the prices of two principal articles of exchange, cotton and silk, were about the same as the year before, while all other articles were far below, showing a relatively larger increase in bulk than the value indicates."

The *New York Financial America* also summarizes the above in the following concise statement:—

"Japan is the one important country of the world with which our 1922 trade shows an increase. Our imports from the whole world in the fiscal year 1922, says the *Trade Record* of the National City Bank of New York, show a fall of 28 per cent. in value while from Japan alone, our imports show an increase of 18 per cent. The 1922 exports to the whole world show a reduction of 42 per cent. in value while those to Japan show an increase of 30 per cent. The imports from Japan in the fiscal year 1922 approximate \$300,000,000 against \$253,000,000 for the fiscal year 1921, and the exports to that country in 1922 were approximately \$245,000,000 against \$189,000,000 in the preceding year. This estimate of the 1922 trade with Japan, adds the *Trade Record*, is based upon official figures of 11 months while those of the trade with the whole world during the full fiscal year are official."

"If commerce and peace go together as suggested by Thomas Jefferson and proclaimed by Richard Cobden, surely our relations with Japan should be most ironic and cordial, says the *Boston Transcript* in commenting on the above figures.

"For our commercial relations with that country are to-day more favorable than with any other considerable land in all the world. It is the one country with which during the last fiscal year our commerce, in both imports and exports, increased."

"In such circumstances, there should be no thought of war between the two countries. 'Peace, commerce and honest friendship' were the relations which Jefferson wanted the United States to maintain with all nations. They do now prevail between us and Japan. And with the commercial relations so phenomenally prosperous and important, there ought to be no question concerning the other two."

The same sentiments are expressed by the *Pittsburg Chronicle Telegraph* which remarks that

"our trade with Japan has the unique distinction of increasing in both directions, while that with every other important country and with the world as a whole is decreasing. Each of the countries is of great and increasing importance to the other, in dollars and cents, in yen and sen. If commerce is associated with peace and honest friendship, then the bonds of peace and friendship between America and Japan should now be strengthening to a gratifying degree."

The great possibilities of the Japan market for our raw cotton, the opening of Japanese cotton buying houses in Texas combined with direct steamship connections which Gulf ports manufacturers expect will increase their sales to the Far East, leads the *Houston Post* to say that

"there are undoubtedly large possibilities for American trade with Japan, and the South has an especial opportunity to share in the benefits. Commercial relations will be enlarged as the political friction between the nations is removed, and they come to a better understanding of each other's peaceful intentions.

"The disarmament conference at Washington accomplished much for better relations between America and Japan. In fact, with the exception of bringing about the limitation of naval armaments by agreement, the development of a new feeling of friendship between these nations was the most important result of the conference.

"With the exercise of discretion and the spirit of fair play, the United States and her neighbor across the Pacific can build up a great trade between them which will be mutually profitable. Americans will be wise to follow the leadership of the business man instead of the politician or the military alarmist in dealing with Japan."

From the Pacific northwest, Japan's purchases of lumber has been the one bright spot in an export trade that otherwise "was on the bum," and spelled prosperity to many concerns where losses were the order of the day. The *Tacoma Ledger* reflecting opinion in that quarter remarks:

"The Pacific coast is vitally interested in Asiatic trade. In fact, it is beginning to be recognized that this coast must look toward the other side of the western sea for the expansion of trade that will make it commercially great—it is in Asia that the commercial future of the Pacific coast lies. The phenomenal growth of trade with Japan during the present year may well be taken as an indication of what may be looked for as time passes, when Pacific coast shippers and manufacturers have worked for the upbuilding of markets of unusual promise.

"The figures are striking because of the fact that they demonstrate possibilities for the future. The Pacific Northwest, with its lumber and timber products, its grains and other staples, may well look more to the Orient for a market, and the course of trade during the past decade is ample assurance of commercial prosperity for the future if the Oriental markets, with their potentialities, are properly cultivated."

From other parts of the country comes the same refrain.

Simultaneous with the general interest displayed in the publication of the official trade returns, Secretary Denby arrived in the United States from his tour of the Orient, and gave Japan a clean bill of health with respect to her friendliness and attitude towards the four-power treaty. Mr. Denby said:

"I believe that Japan is living honorably to every detail of her obligations under both treaties. I was much impressed with the confidence exhibited by the Japanese in the success of the pacts and believe that Japan, as well as the United States, has come to realize that the new international arrangements in the Pacific are beneficial to everybody concerned. I also noticed similar feeling in China."

At a time when American editors were rejoicing over the closer understanding brought about through increased trade and a member of Harding's cabinet was hurrying home to testify to the good faith and honor of Japan, the American chamber of commerce of China is made to say by a publicity agent that Japan cannot be trusted to live up to her pledged word, without close scrutiny on the part of Americans.

At a time of great world trade depression when American exports to all other countries shrunk in value 42 per cent., those to Japan increased 30 per cent. As our best Asiatic customer, Japan turned the scale for many American manufacturers in one of the worst years in the history of world commerce. Under these conditions it is difficult to understand why Japan should bear special watching.

The trade returns quoted above, however, give only half the story. The real situation is revealed in a study of the trade of Japan with special reference to that with the United States published as a special monograph by the United States Tariff Commission, under the title "The Foreign Trade of Japan." In this new revised survey of the trade of Japan the statistical information has been brought up-to-date and new material included. Section four of this valuable report is devoted to a general study of the trade of the United States with Japan and includes a comparison of the relative value of the trade of each country, with war and post-war changes and a somewhat detailed analysis of the trade movements of the more important commodities and groups of commodities.

The remarkable fact is brought out that "notwithstanding the tremendous increase in trade with other Asiatic countries, especially as measured by percentages, Japan has been and is the main source of supply for the American imports coming from Asia. Since 1917, the imports from Japan to the United States have been about double those coming from any other Asiatic country. Correspondingly, Japan affords a larger market for the United States exports than any other Asiatic country, and in the more recent years the relative importance of this market for the United States has increased slightly. If the trade of Asiatic Russia, largely a war product, be excluded, during the last few years Japan has taken with an occasional exception, from three to five times as much of the American exports as has any other Asiatic country. China has been the second largest market for the United States exports in this

region, according to official statistics, though falling far below Japan in this respect. However, a certain part of the United States exports to Japan is re-exported and finds an ultimate market in China or other Oriental countries."

It is difficult to go behind these figures. The official findings of the United States Tariff Commission supplements the trade returns for the past fiscal year and brings home to the American people the vast importance of their trade with Japan and of the necessity of preserving the most friendly relations with such a good customer. American trade with China has also assumed large proportions and will increase with the purchasing power of the people. In time, no doubt, it will be the greatest market for manufactured products in Asia. Every legitimate means within our power should be employed to encourage its development, but if our gains in this direction are to be offset as the result of political agitation against Japan by a corresponding decrease in our trade with that country, it is simply transferring the profits from one pocket to another.

The report of the U. S. tariff commission will go far towards educating Americans to the fact that the vast latent possibilities of the Chinese market cannot be compared with the immense immediate profits awaiting our merchants and manufacturers in the Japan of to-day. The sober, common sense of the American people will insist upon a discontinuance of a campaign which tends to alienate the good-will and friendship of a customer whose trade, according to the highest expert advice, is worth three to five times as much as that of any other Asiatic country.

* * *

Keep All the Doors Open

It was eminently proper for the executive committee of the American chamber of commerce to suggest to its minister at Peking to watch the Shantung negotiations in order that their interests be not impaired, in the same way that similar resolutions on other matters are conveyed to the proper authorities, but it was eminently improper, to give this confidential resolution to a press correspondent who immediately utilized the information as the basis of a long article which conveyed to the minds of the people of the United States that Americans in China placed no confidence in the honor of Japan. As this is the second time within the year that confidential discussions of the executive committee of the American chamber of commerce have been immediately imparted to publicity agents of the Peking government, it is time that notice be taken of methods which for all practical purposes makes the chamber an adjunct to the Chinese publicity system. These tactics are out of date, opposed not only to the policy of the American government but to the higher interests of the American manufacturer at a time when his trade with Japan is the brightest signboard on the tortuous highway to prosperity.

Keeping the door open in China is a strenuous job, and for the past few years the watch-dogs of American commerce have been concentrating their attention upon the activities of Japan to the exclusion of other equally important trade matters in other parts of Asia. If the interests of the two or three bona-fide American concerns established in Shantung are of sufficient importance to move the executive committee of the American chamber of commerce to bestir itself to see that they are fully protected in open negotiations having for their object the restoration of the province to Chinese sovereignty, then the precedent should be followed in all similar diplomatic dealings between China and other governments. Not long ago, press dispatches from Peking carried the information that Foreign Minister Dr. Wellington Koo had ordered all the documents bearing on the Tibetan controversy to be gathered for his information preparatory to resuming negotiations with the British government for a settlement of this outstanding question. It would be eminently proper for the watch-dogs to introduce a resolution in the American chamber of commerce that these negotiations also be most minutely scrutinized for the

protection of American firms in Szechuan dealing in Tibetan produce, whose interests are equal to, if not greater, than those American firms operating in Shantung. There may be an American or near-American firm established in Gartok, in Gyangtze, or out in Kashgar, for all we know, whose interests demand that their rights to equal opportunity be not impaired in any negotiations between Great Britain and China, especially when the terms of the original Tibetan convention are called to mind. Within the next decade or so, the world will turn more and more to central Asia and the Roof of the World for its supply of valuable minerals and oil supplies, and the clause which closes this *eldorado* to foreign mining concessions would then constitute a most flagrant violation of the rights of Americans to equal opportunity in the development of this vast region.

The gold fields of Tibet are reputed to be enormously valuable, and with aerial transportation, the time may not be far distant when the world will draw on these hitherto untouched deposits. So Americans might as well bring this to the attention of their official representatives and insist upon close scrutiny of any negotiations between China and Great Britain, in fact, we ought to have a delegate sitting in at the meetings to be sure that nothing is "put over" that will help the climate to freeze us out of Tibet.

We are also positive that the interests of the few American trading concerns in Mongolia are of far greater importance than those of the two or three established in Shantung. Does not the most important American concern in China have its branches in Kalgan, Urga and elsewhere in Mongolia? Did not Americans open up this country by establishing motor services across the wastes and are not various American concerns in Tientsin deeply interested in its development? In order to play the game all around, the American chamber of commerce of China should call upon its minister to see that the Soviet does not close the door to American trade in this region. In order to support the policy of the American government laid down so emphatically during the organization of the consortium, Russia should be given firmly to

understand that we will brook no nonsense in Mongolia, a most important part of the Chinese republic.

American trading interests are quite large in northern Manchuria and eastern Siberia and unless the American chamber of commerce does not wish to go on record as singling out Japan for their suspicions, the American minister should at once be invited to keep a close eye on the Changchun or any future negotiations. One never can tell about a government which forcibly takes possession of and drives American traders out of a vast territory and stations its troops in Urga in violation of China's sovereignty, especially after the American government was so explicit in defining the status of this territory when pressure was being exerted upon Japan to conform to our ideas. Why not bring a little pressure to bear upon Russia and the Far Eastern Republic to compel adherence to the consortium policies?

And while we are at it, let us keep a weather eye on the future of American trade in Yunnan. We were recently asked by an American manufacturer what the chances of success were if he opened an agency in Yunnanfu, and would he receive equitable treatment on the Yunnan railway. As we were ignorant of the exact situation in this corner of China, we were unable to answer his question. Now, it would be highly commendable if the watchdogs of the "open door" would stop barking at Japan and concentrate their attention for awhile on these other matters. At least, let us be impartial in our suspicions and when we pass such resolutions let us give the same publicity to them as we did in the case of the Shantung affair. We are certain that the large American firms operating in Mongolia whose agents have been forced to flee before the ire of the Bolsheviks will deeply appreciate such a resolution and the American firms up in Chungking, Tachienlu and Batang, not to mention the solitary trader in Gartok and the lone storekeeper at Gyangtze, will feel easier when they know that some one in Shanghai is keeping an eye on Great Britain in Tibet.

G. B. R.

SUN YAT-SEN

Will China Come Under the Influence of Germany and Russia, or Drift Into an Alliance with Japan?

THE *Hongkong Telegraph*, in an "exposure" of Sun Yat-sen, says that the failure of one of his subordinates to burn certain secret documents as instructed by his chief, has led to the discovery of a startling scheme for the creation of a triple alliance between Germany, Russia and China, based, there is little doubt, on bolshevik ideals. The papers, according to the *Hongkong Telegraph*, are incriminating to the point of absolute conviction and show that Sun Yat-sen has been a prime mover in the scheme for the carrying out of which he has been indirectly in league with Admiral von Hintze, the former German minister to China. The *Telegraph* concludes its exposure of these documents by saying that all who value the integrity of China and who are anxious for the country's welfare should from now on hesitate to place faith in a man who works hand in glove, secretly and in dark ways, with the spreaders of doctrines of a most destructive character. In conclusion, the paper states, that it will be surprised if Sun Yat-sen is any longer permitted by the French authorities to reside in the French concession in Shanghai, where he is likely to carry on the negotiations which were somewhat abruptly terminated by the recent upheaval in Canton.

We are going to assume that the evidence unearthed by the *Hongkong Telegraph* is genuine. THE FAR EASTERN REVIEW has steadily supported the leader of Chinese liberalism for many years; because we are convinced to our satisfaction that he is honest,

capable in many ways, and inspired with love of country and the establishment of principles that no honorable Anglo-Saxon can criticize. We have followed his career with a greater interest and sympathy perhaps than any other journalist, and are convinced that he has failed to receive a square deal either from Peking or from the outside. We have watched the campaign to discredit him from its inception in 1913, and can, if necessary, trace much of the malicious propaganda to its original sources. The pettiness of it all is disgusting.

If it should develop at this time that Dr. Sun Yat-sen is flirting with the Russians and Germans it is not strange when it is recalled that much of his political misfortunes are traceable directly to the intervention and meddling of other powers in the domestic affairs of China.

Dr. Sun started honest, friendly to the liberal powers of the west from whom he absorbed his political ideas, and with an earnest intention to apply a democratic form of government to China. He unselfishly resigned the provisional presidency in favor of Yuan in order to avoid further internal strife and accepted the difficult task of restoring China's sovereignty over her railway system. From the very start he was ridiculed and scoffed at as a dreamer, not so much because of the extent of his original scheme, but from the fact that his success meant the abolition of the closed sphere doctrine, the restoration to China of her sovereign rights to control her own transportation system. The advocates of special privilege saw

their hopes fade away with the development of Sun's plans and the concentration of future railway construction under one independent bureau removed from the influence of party politics and the pressure of the legations at Peking. Sun's success foreshadowed the collapse of the elaborate structure erected by foreign powers for the control of China's internal development, and under given conditions, the partition of the country into spheres of political control. It was natural that he should receive little sympathy from a foreign press intent upon defending the system which underlaid the policy of their various governments. Sun was called a dreamer, because no foreigner could visualize his plans from a patriotic Chinese viewpoint. No one can accuse Dr. Sun Yat-sen of being anti-British in those early days when he was trying to finance his railway scheme. As a matter of fact, the only beneficiary of his scheme was the British firm of Pauling & Company who received the contract for the Canton-Chungking railway, a fifteen hundred mile line, subsequently changed to the one from Shasi to Singyfu. When the news was cabled to London that he had started the second revolution and his powers were revoked, three other British firms were ready to sign agreements for thousand mile railway contracts on the same terms as those arranged between Pauling & Company and Dr. Sun Yat-sen. With the exception of one contract in France, British interests would have been the sole beneficiaries of Dr. Sun's much criticized scheme. Yet Sun's most bitter critics were certain British journalists who, as subsequent events have proven, were more interested in preserving the field for the official monopoly than in having independent British concerns enter into competition with it. By common consent, the advocates of special privilege came together to denounce him, sneer at him and undermine his reputation. The ball that was started rolling in 1912 has never stopped. The men who started the libel have stooped to the vilest calumny against their old friend in order to solidify their positions with their military employers.

Lured by the offer of fat jobs from the Peking government, many of his trusted lieutenants deserted his standard and justified their treason by proclaiming his incompetency in practical statesmanship. These men, many of whom are now occupying high positions throughout China, are his most bitter enemies, knowing that if he should emerge from his political campaigns as president or premier, their days of usefulness are numbered. Fear of the consequences, brings this group together in a solid phalanx to keep him down by any and all means within their power, and foreigners attached to them in one capacity or another have taken up the fight against Sun in order to preserve their own positions. This lies at the bottom of much of the hostility towards Sun Yat-sen.

During the first revolution, Sun Yat-sen was not unfriendly to Japan, in fact, several Japanese accompanied him to China and were attached to his staff at Nanking, much to the disgust of others who aspired to influence his policies. Dr. Sun realized better than any other Chinese official the great menace to China's integrity concealed in the unchangeable imperialistic policy of Russia and was the only Chinese that we know of who took to heart the rape of Mongolia and started a movement for its recovery. His much criticized financial scheme which contributed so largely to his loss of prestige as a practical statesman was devised to supply the funds for carrying on a military campaign against Russia for the recovery of Mongolia and the full restoration of China's sovereignty in the Ili and Sinkiang regions. Sun had no illusions about the ulterior motives of Russia and in all his railway schemes insisted upon the inclusion of lines which would terminate on the Siberian borders and open up Mongolia to the colonization of his countrymen. Too well indeed, did Dr. Sun sense that if Russian policy laid down so emphatically in the protest against the construction of the Chinchow-Aigun railway, was permitted to stand unchallenged, sooner or later Northern Manchuria, Mongolia and Sinkiang would be brought under the rule of the Czar. Russia had declared that the construction of any Chinese railway which endangered her strategic position along the Amur river would be considered as an unfriendly act, and this principle was extended to all other lines which might consolidate China's authority over her far-flung border lands.

Russia could build railways that impinged upon the sovereignty of China, but China was prohibited the right of building any lines within her own borders which might in any way be construed by Russia as inimical to her plans of conquest. China was meat for the Bear, but to our certain knowledge not one Chinese official ever fully sensed the danger or took steps to save the nation from the menace, until Dr. Sun boldly traced the projected Mongolian railways deemed essential to the safety of his country. And in his subsequent exhaustive studies of China's development he elaborated these plans to show the necessity of opening Mongolia to Chinese colonization. There was nothing pro-Russian about Dr. Sun Yat-sen up to one year ago. If he has changed since then, there must be some good reason to explain such a *volte face*.

Let us go back to the original reorganization loan of 1913 forced through by the powers against the repeated protests of the Kuomintang and which provided Yuan Shih-kai with the millions to consolidate his power as dictator and enabled him to lay his plans for the overthrow of the one political party that opposed his dreams of autocratic rule. Dr. Sun had no illusions about the use these millions would be put to, and in the early days of 1913 sent telegram after telegram to London, Washington, Paris, and Berlin protesting against such an enormous advance to Yuan. President Wilson alone refused to join in this so-called administrative loan, though for reasons entirely of his own, and with little thought for the preservation of democracy in China. The loan went through and within a month the leader of the Kuomintang party (Sun Jao-ren) was murdered in cold blood by the emissaries of Yuan. Yuan's purpose was revealed and Sun started the second revolution, was defeated at the outset, proscribed, forced to flee the country and live in exile in Japan. The parliament was soon afterwards dissolved and the Kuomintang leaders and members hounded out of Peking or thrown into prison. The reorganization loan did exactly what Dr. Sun feared it would do. It killed democracy in China and ushered in the era of militarism which for ten years has desolated the country and brought the government face to face with bankruptcy and foreign intervention. Who was to blame? Let those who were foremost in supporting Yuan Shih-kai because they desired a "strong man" at the head of the government, search their consciences and answer it to their own satisfaction.

Then came the memorable days of 1917, when America entered the war against Germany and Wilson invited the neutrals to line up on the side of democracy.

China lay disorganized with the militaristic crew battenning on the life blood of the people and striving to unloosen the purse strings of American financiers in order to add to their store of ill-gotten wealth. China had no heart for a war with Germany. She had no particular quarrel with that country and made clear her wish to be let alone. But foreigners in Peking playing upon her hopes and fears and holding out the inducement of being placed upon a plane of equality with Japan at the peace conference, forced the president to reluctantly sever relations with Germany.

Sun Yat-sen and his party were opposed to China's entrance into the war, not because of any special love for Germany, but from the fear that such a step would increase the power of the militarists and destroy any hope of reviving a parliamentary government. His fears were realized. Democracy in China received a set back from which it has not yet and may never recover. China did not enter the war of her own free will. The president was literally forced into it, bullied by the celebrated "Flying Wedge," and when all other suasion was found useless, was threatened with civil war in the Yangtze if he held out for neutrality. The hope of participating in the American war loans to the allies reconciled the Peking militarists to finally declaring hostilities, yet at all times the southern parliamentary party vigorously protested against a step they well knew would eliminate them as a factor in the government. The allies virtually placed Sun Yat-sen in a position where the force of circumstances brought upon him the suspicion of being pro-German. When the subsequent Japanese loans to Peking provided the funds for breaking the backbone of the parliamentary movement it told Dr. Sun that the cause of liberalism in China had

no friends amongst the nations who were loudly proclaiming their intention of making the world safe for democracy. At the very time that President Wilson was calling upon the manhood of America to make the great sacrifice in behalf of our ideals, the American minister at Peking, by forcing China into the war, effectively gave the death blow to democracy in China. Principles that applied in the west did not apply to the east. Democracy in China was crushed under the heel of a militant autocracy in order that democracy in Europe might triumph.

Up to 1918, Dr. Sun was most friendly to Japan, but when loan after loan was made by Nishihara to Peking, strengthening the power of the military autocrats and enabling them to carry on an active campaign to bring the south under subjection, his sentiments towards that country underwent a marked change. From a friendly ally he became a bitter enemy, and has since justified his uncompromising antagonism to any understanding with the north on the ground that the Peking authorities were sold body and soul to Japan.

It has never occurred to the Chinese or to the many foreign critics of Japan that these loans were eminently proper from the viewpoint of the Japanese government which was financing a partner under a "War Participation Pact" entered into for the express purpose of defending both China and Japan from the spread of bolshevism in eastern Asia. In the same manner that Great Britain first and America afterwards financed their allies in Europe, so Japan tried to build up an effective military force in eastern Asia for defense purposes. The menace from the north overshadowed in importance the long drawn out civil disturbances and revolutions in China and Japan had no option but to treat with the recognized government at Peking and bolster it up in order that it might co-operate in checking the onward rush of the red wave of terror. It is lamentable that much of the funds so advanced were employed against the south. It is the one reasonable complaint that Chinese or foreigners have the right to make against many of these much condemned Japanese war-loans to Peking. There may have been many ulterior motives behind these loans, we do not defend them, but the outstanding fact will remain that the Japanese government directed by a military premier, the highest officer of the army, was fully justified in time of war to take every precaution financial and strategic to assure the close co-operation of China's northern military leaders in any measures for the common defense of both nations in northern Manchuria and Mongolia, and, if in due course of time, the question of the validity of these loans is ever brought before an international tribunal, the verdict will be given to Japan. When the fierce opposition to these loans and the war participation pact is recalled, the impression is created that foreigners in Peking would gladly welcome the ascendancy of Russia in eastern Asia rather than see China and Japan co-operate to protect their mutual interests.

On every side interference on the part of the allies only helped to perpetuate in China the system they were fighting to eradicate in Europe. Human nature being very much the same the world over, it is only natural that Dr. Sun and his friends should view with increasing suspicion the professed good-faith of nations who repudiated in Asia the principles they were struggling to uphold in Europe.

And when Dr. Sun went to Canton and established himself as president of the southern republic, determined to oppose force with force, he carried with him the enmity of nearly every foreign writer in China. Instead of a friendly or kindly word of encouragement or sympathy, any slight approval of the principles he was struggling to give effect to, principles that are dear to the heart of every Anglo-Saxon, upon which their very liberties and governments are founded and for the preservation of which they are willing at a moment's notice to lay down their lives, he was reviled, insulted, ridiculed and attacked from all angles. Not once was a friendly word uttered in his behalf by the Peking correspondents of a foreign press whose policies they influenced. Never in the history of journalism has such a malignant campaign been waged to destroy

the character and standing of a political leader, as that directed against the protagonist of democracy in China.

Americans and Britons alike, men who cheerfully and proudly did their bit in France to uproot German military autocracy, on their return to China forgot the principles they hazarded their lives to uphold and joined in the pack that barked and yapped at Sun Yat-sen in order to ingratiate themselves with the military outlaws and freebooters who had usurped the power of government at Peking. Dr. Sun had his faults, but he stood for principles that demanded the respect and sympathy of all honest Americans and Britons. Betrayed, villified, hounded and distrusted by those whose doctrines of government he was struggling to implant in China, abandoned and condemned beforehand as a political adventurer by the representatives of the liberal powers at Peking, finding himself rejected by those he had every right to expect support from, can Dr. Sun Yat-sen be condemned, if he turned in desperation to Germany and Russia?

Foreigners refused to recognize him as a leader of democracy: they stubbornly extended their recognition to the military oligarchy that is Peking, and denounced him as a political fakir, a firebrand, a Mazzini and an upstart demagog. If Sun Yat-sen turned towards socialism, or communism, and sought political leadership through the organization of the Chinese workers, who is to blame for his conversion, or backsliding?

Since the Paris peace conference, THE FAR EASTERN REVIEW time and again, in season and out, has called attention to the trend of Russia and German policies in Central Asia. The only bulwark against the spread of bolshevism and the development of the Russo-Germanic designs in this region was the army of Nippon co-operating with the armies of China. An intense, blind jealousy of Japan brought all the allies together to frustrate such a combination. Japan's plans for the defense of eastern Asia against the "come-back" of a Teutonized Russia were vetoed by the powers, led by America. She was compelled to forego the military alliance with China and to surrender to the consortium her rights to defend herself. Japan was hamstrung in Manchuria and Mongolia while the way was opened and smoothed for the Soviet to take up the old policies of Russia where the ministers of the Czar left off. The consequence is seen in the occupation of Urga by a red army with the road open for further advances by the weakness of China and the withdrawal of Japanese troops from Siberia and northern Manchuria. With their eyes wide open, Britain, America and France made it impossible for Japan to guard their interests in eastern Asia and for all practical purposes invited the Soviet and Germany to step into the field and carry out their program in China.

Dr. Sun's deep rooted conviction that he is personally opposed by British interests and abandoned by America, and with his hatred towards Japan for her loans to the northern militarists, and with the knowledge that Japan's power for aggression has been circumscribed by the consortium pact and the Washington treaties, has prepared the way for Germany and the Soviet to bring him under their influence. Here we have the aftermath of ten years of bungling diplomacy, a decade of meddling with the affairs of China that has led to a situation portentous with grave events.

If Dr. Sun Yat-sen has actually reached some understanding with von Hintze and Moscow, and in time comes into power and brings about a Sino-Russo-Germanic alliance, who is to blame? American and British jealousy made a Sino-Japanese understanding impossible and now they must face the possibility of a sovietized China directed from Berlin. Well may the meddlers of Peking tremble at the thought of the consequences. They have willed just such a catastrophe by their stubborn opposition to Japan.

We have stated a case without bias. We do not uphold Dr. Sun. If it turns out that the disclosures of the *Hongkong Telegraph* are true to fact, and it is proven that Dr. Sun has engaged in secret negotiations with Berlin and Moscow to bring about an alliance between the three nations, he forfeits any further sympathy and support from Americans, Britons and Japanese, but this cannot eliminate him from a front place in Chinese politics or prevent him

from carrying forward his program for organizing the workers of China along socialistic or even communistic lines. The damage has been done. Western liberals have turned their backs on the leader of Chinese democracy. They may have to pay the price, whatever it may be. By our meddling we have only made it harder for China. We have thrown the burden once more upon Japan who will be called upon to be the goat for the mistakes of a clique of professional agitators and literary diplomats.

It may be difficult to stem the socialistic or communistic movement in China, it may be impossible to keep Sun Yat-sen forever from acquiring power, and the day may well arrive when the bunglers of Peking will be face to face with the necessity of choosing between a China directed from Moscow and Berlin or one allied with Japan. The choice may have to be made. A sovietized China allied with Russia and Germany means the spread of the movement towards India, the goal of Russian and German political avarice. By their opposition to the renewal of the Anglo-Japanese alliance the British in China will find themselves in a serious predicament, compelled to choose between a China dominated by their traditional enemies or by the ally they discarded in order to cement their friendship with China. If such a time ever arrives and Japan is once more called upon to step into the breach, Great Britain will pay the price demanded by Japan. The question may well be asked, how far Japan is expected to sit by with her hands tied by pacts and agreements while Germany, Russia and China are preparing plans for her undoing?

In our humble opinion, Americans and Britons in China have committed a grave error in rejecting Dr. Sun Yat-sen as the leader of China's republican movement. We incline to the belief that it is not too late to remedy the past by extending support to him. We believe that Sun Yat-sen would much rather march in harmony with the liberal nations of the west than with the radical powers of Europe, and that the time has arrived to call a halt to the campaign of vilification that must have inclined him to listen to the overtures of the enemies of democracy. It is much better for America, for Great Britain and Japan to have Sun Yat-sen on their side than allied to their enemies. Sun is generous, big-hearted, and amenable to reason, to good advice. We cannot eliminate him as a factor in Chinese politics. We cannot break his hold over a large section of the masses of this country. Instead of alienating his friendship why not try the other method and cultivate and assist him in his herculean task of implanting a demo-

cratic form of government on the ruins of a military autocracy. It is much better this way than by forcing him into the arms of Berlin and Moscow, and having to face the possibility of asking Japan to defend our interests in eastern Asia. If the *Hongkong Telegraph* is correct, the choice lies before us.

G. B. R.

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Since the above was written, Dr. Sun Yat-sen has issued a statement in which he admits having entered into the correspondence disclosed by the *Hongkong Telegraph*, but insists that the translation is garbled, and, as an offset to the charge that he is in favor of communism, invites attention to his recent work entitled "The International Development of China" which rests primarily on the support of the great financial powers. In his opinion, both Germany and Russia under their new forms of government have ceased to be a menace to the integrity of China and because of this he would have a more perfect working understanding with them. Dr. Sun, however, failed to make any mention of the presence of a large Russian force in Urga which has repeated the rape of 1912 by usurping the sovereign powers of China in Mongolia. He was ready to fight Russia at that time to restore the dependency to China, and staked his political reputation in a scheme for financing the army that was to drive the Russians back to the Urals. Dr. Sun seems to ignore that the continued presence of a large Russian force in that region must sooner or later give rise to complications that may not be so easy to settle by conferences around a table in some luxurious hotel. We see no reason to modify our opinions after reading his public statement. If Sun Yat-sen has been driven to seek a closer understanding with Germany and Russia is it not because Americans, and British have made it impossible for him to hope for any friendly support from the champions of democracy in the West? Sun has one grand dream: the development of China, the building of railways, of ports, of factories, mills, steel plants and the opening of mines. This is his one obsession. It is hardly likely that he would jeopardize the industrial future of his country for the sake of an alliance or understanding with the two nations in the world who at this particular time are impotent to further his plans. We still believe that the best interests of America, of Great Britain, of France and Japan will be advanced by extending support to his plans for the unification of China under a liberal and democratic form of government.

Unifying American Interests in China

IF there is one thing that American interests in China need above all others it is unification, the will to pull together and work for the common good. For the past eighteen years we have lost opportunity after opportunity because of the absence of an intelligent and practical policy, and because clique after clique has attempted to impose its will upon the government. Some of the most promising and important projects which would have placed American interests in this country on a par with those of Great Britain, have been knifed by petty governmental jealousy and support to Wall Street favorites. For many years the big things of China have been maintained as a close preserve for special interests, and the interloper, the rank outsider, could hope for little support from officials in Washington allied with the system. Under the last administration American participation in the development of China became largely the particular perquisite of specially invited and favored combinations, with the consequence that the field became hermetically closed to large contracts requiring Chinese governmental guarantees. In purely commercial circles American policy has been moulded by a close inside combination which at times has resorted to the most

questionable methods in order to force acceptance of its viewpoint. Common sense and sound business principles were swept away by a wave of sentiment, an appeal for Chinese trade based on political reasons. American business with the Chinese government has been conducted on a basis which reflects little credit on the judgement or ability of those responsible for the present situation.

The silly sentimentalism of a past régime in our Far Eastern diplomacy, brought us to the verge of war in the Pacific and it required the combined efforts of every sensible republican statesman to ward off the calamity and restore good relations with Japan. In the same manner, as Secretary of State Hughes was compelled to take heroic measures in diplomacy, so Secretary of Commerce Hoover is now forced to institute measures that will protect the investments and ensure payment for American materials delivered to the Chinese government at a time when we were officially advised that its credit was so good that no security was required for bonds sold on the American market, and that it had so much ready money that it could pay cash for everything it required.

The Chinese government now owes to American financial and manufacturing interests approximately \$30,000,000 gold, and to

affect a unification of these debts, Secretary Hoover has appointed an advisory committee of industrial leaders, whose duty it will be to suggest a practical plan whose object is to place the American interests on an equal footing with those of France, England, Japan and other countries, which present a solid front when the interests of any national is concerned.

The personnel of the committee, which represents companies owning the major portion of the doubtful Chinese debts, is: M. A. Oudin, International General Electric Company, Schenectady, N. Y.; Charles M. Muchnic, American Locomotive Company, New York; E. S. Glines, Lam, Glines & Co., New York; A. I. Esberg, vice-president of the San Francisco chamber of commerce, and Frank Waterhouse, Frank Waterhouse & Co., Seattle.

The foreign debt of the Chinese government is approximately \$100,000,000, one-third of which is owing to American interests. The department of communications owes American concerns \$16,000,000 gold for railway supplies, ministry of finance owes two American banks \$11,000,000 gold for loans and \$3,000,000 gold are scattered debts, all insufficiently secured and the stringent condition of the Chinese treasury makes it necessary that steps be taken to obtain more adequate security, at least.

The advisory committee will make a thorough study of the entire situation and make recommendations to Secretary Hoover regarding the interests of all American nationals and the best way to protect them. Mr. Hoover will then take the matter up with the department of state.

Heretofore, creditors of China in the United States have had more or less to look out for their own individual interests, while British interests have acted solidly through their effective organization backed up by a national trade policy. Other countries have combined their interests in like manner, thus being able to make a much deeper impression on the sorely harrassed Chinese financiers.

It is hoped that, when the Chinese begin receiving the additional revenues from the per cent. increase in import duty rate granted by "Nine Power Treaty on Chinese customs duties," a sufficient amount of these revenues will be appropriated to adequately secure American debts. By solid representation it is believed this can be brought about, and possibly interest charges secured.

Not only in the funding of present debts will the scheme benefit American interests. Instances have occurred where American concerns have been sorely hand-capped by "crossing wires" in their dealings with the Chinese. One case was cited where one American firm, bidding on an electric tramway franchise in Harbin, had secured an option from the concessionaire and signed a preliminary contract. Another firm, also American, came in and made certain promises, and secured the contract. This threw the matter into a lawsuit, and the present status is that both American firms are very likely to lose the franchise to unified Japanese interests. Many such cases have occurred.

The committee will also act permanently in an advisory capacity to the Far Eastern division of the department of commerce in the dissemination of information received by that division. It will make a careful study of all matters appertaining to the Orient in order to be in a position to report on any matters put up to it by the department.

It is to be earnestly hoped that the appointment of this committee will be the first step towards a real unification of American interests in China that will extract American business from the mire of international politics and sentiment and place it on a sound practical working basis. As long as politicians, political advisers, propagandists, agitators and biassed sentimentalists are permitted to dominate or influence American business and financial matters in China, we can hope for little real progress.

Leonard Wood

LEONARD WOOD will remain at his post as governor-general of the Philippines "so long as he feels his presence is essential to the success of his program." This is his answer to the question of who will be his successor, a matter which has agitated political circles in Washington as the time drew nigh for him to enter upon his duties as president of the University of Pennsylvania.

Once again Leonard Wood sacrifices his ambitions and personal welfare in response to a call to public duty, sticking to the task he started until it is completed. His presence in the Far East the past year has been a Godsend to American prestige and influence. He has exerted a marked influence in stabilizing the uncertain international political situation. Working in close harmony with Warren in Tokyo and Schurman at Peking, the trio have been as towers of strength to Harding and Hughes in restoring the balance in the Pacific and infusing new life in American diplomacy. This phase of his work has been overshadowed by his accomplishments in the Philippines, but in our opinion it will stand as one of his greatest achievements.

From the time he started on his tour of investigation he made his influence felt for peace and harmony in the Pacific and at least one of our most prominent anti-Japanese leaders who was aboard the steamer which conveyed the Wood-Forbes party to the Orient experienced a change of heart. General Wood's trip through China where he saw conditions at first hand, and his subsequent visit to Tokyo was in reality the first step in making the Washington conference a success. In Tokyo, for the first time in the history of American-Japanese relations, the military leaders of both nations sat around a table and talked in the language that men understand. Both sides understood each other perfectly, and with a clear con-

ception of each other's viewpoint, the way was paved for the diplomats to put on the finishing touches and write the pacts which have brought the two nations into the most harmonious relations. The return visit of General Tanaka, the leader of the military party in Japan, to Manila, cemented the understanding. The glory goes to the diplomats, but it is safe to say that if the preliminaries had not been thoroughly thrashed out by the fighting men, in which each side made known its irreducible minimum, the story of the Washington conference would remain to be written. This much, American prestige in Eastern Asia owes to the common-sense and broad-mindedness of Leonard Wood.

Aside altogether from the purely local aspects of Filipino reconstruction and politics, the presence of Wood in the Orient for the next three years is essential to the proper safe-guarding of national prestige. The Far East is in a state of ferment. China is chaotic, on the verge of breaking up through domestic strife. No one can foretell the immediate future. Foreign intervention may become necessary as a result of the complete breakdown of government in China. The Bolsheviki may grow bolder and swarm down from Urga, where it is admitted they have a force of 6,000 with another 50,000 stationed along the Mongolian borders. Against her wishes, Japan may be compelled to take action to protect her vital interests. The old order in Japan is gradually giving way before the advance of liberalism. Material changes may be expected in that capable country.

The centre of American power and influence in the Far East will remain in Manila and we must keep ourselves prepared to face any sudden change in the general Asiatic situation. It is vitally essential at this time, that we have a strong man in command in the Philippines, one who has the confidence and support of all parties

at home in the carrying out of American policies. The one man who has such a thorough grasp on the situation and who has already done so much towards rehabilitating American prestige in the islands and throughout the Orient, should remain at his post, prepared to meet any emergency that may arise. Americans in China need Wood in Manila fully as much as he is needed by those whose interests are more intimately interwoven with his immediate duties.

Already he has brought the islands back to a stable financial basis by rehabilitating the currency system and paring down the budget expenses. The oligarchy which dominated insular politics has been overthrown, the judiciary has been reformed, an efficient civil service established and public works pushed forward. Sanitation, hygiene and agriculture have been given a larger measure of official support and harbor works extended. Much has been accomplished. Much more remains to be done. The work of years was destroyed in a wave of sentiment, and it will take years to recover lost ground and restore to the islands the material prosperity and political stability that marked the close of the first era of American unselfishness in the rule of an alien people. From all angles Americans need Leonard Wood where he now is. The nation is to be congratulated that he is to remain to finish his task, until the time is ripe for his successor to take over and carry out his policies. When that time arrives, the situation will still demand a man of Wood's type to maintain the high standard he has set.

Pan-Pacific Conference

A REMARKABLE gathering is scheduled to be held in the centre of the Pacific Ocean this fall.

From October 25th to November 8th in Honolulu the "key men," in matters of commerce and finance, from the lands bordering the greatest of waters are to meet each other daily to formulate plans for future interracial co-operation in bringing about the development of those interests common to all the peoples of the Pacific area.

These men representing government departments or commercial bodies are being carefully selected from each country. They will be guests of the Pan-Pacific union. These delegates will represent the two-thirds of the world's population which is tributary to the shores of the Pacific Ocean. They realize that the Pacific is to be the future theatre of the world's commerce. They know that the traditions of peace that have always prevailed in the Pacific can best be maintained by the leaders of men in all lines of thought and action in Pacific lands meeting together and establishing among themselves a foundation of mutual confidence on which will be built co-operative effort.

Following the precedent established at the other conferences of Pan-Pacific scientists, educators and press men, called by the Pan-Pacific union, it is expected that President Harding will sound the key note of the commercial conference in his message, to be read by the governor of Hawaii at the opening of its sessions. Secretary of Commerce Herbert Hoover has already penned his message and is sending unofficial delegates as are the departments of agriculture, navy and interior in the United States, as well as the department of trade and commerce in Canada and the proper governmental departments in the other countries of the Pacific. Besides these delegates from governmental departments the U.S. chamber of commerce has appointed five delegates. It is understood that the president and secretary of the national foreign trade commerce will attend with a proper delegation from that body; the presidents of the Pacific coast city chambers of commerce propose attending with delegations composed of leading business men, while from Australia, New Zealand, China, Japan and other Pacific lands, financial organizations or boards of trade will send their leaders.

The presidents and premiers of Pacific lands are heads of the Pan-Pacific union, which, although an unofficial body, is supported

in part by appropriations from Pacific governments. The state department has transmitted the invitation of the union to the Pacific governments to send their delegates and it is expected at this conference in Honolulu that a firm foundation will be laid for future friendly commercial understanding in the Pacific area.

An interesting feature of the conference will be the presence and participation on the part of the deans of a number of commercial colleges connected with Pacific universities—this at the request of Japan. It is said that throughout Pacific lands, including the United States, a full million men have taken or are taking foreign trade study courses. These men will guide the future commerce of the Pacific area, and their co-operation is desired by the commercial conference. Viscount Shibuzawa is organizing the Japanese delegation, and Hawking Yen, one of the delegates to the Washington conference, with H. Y. Moh of the Shanghai chamber of commerce, the Chinese delegation. Manila and even far off Java on the edge of the Pacific expect to send their delegations, and Siberia has already appointed hers.

Alexander Hume Ford, director of the Pan-Pacific union, has made a tour of the United States and Canada in the interests of the conference and is now meeting in their home cities those who will attend from the Orient. Percy Hunter, one of the Australian founders of the union, has made a trip from London to Hawaii and back to Australia to interest that country in sending a representative delegation.

The delegates from the Pacific lands will be entertained in Hawaii for two weeks. Here they will be together all of the time and as all of the delegates will speak English, it is expected that many lasting international friendships will be brought about.

The American, Canadian and Latin delegates will sail from San Francisco on October 18th.

The chief topics to be discussed at the conference are communication and transportation, development and conservation of natural resources, finance and investments, inter-national relations in the Pan-Pacific area.

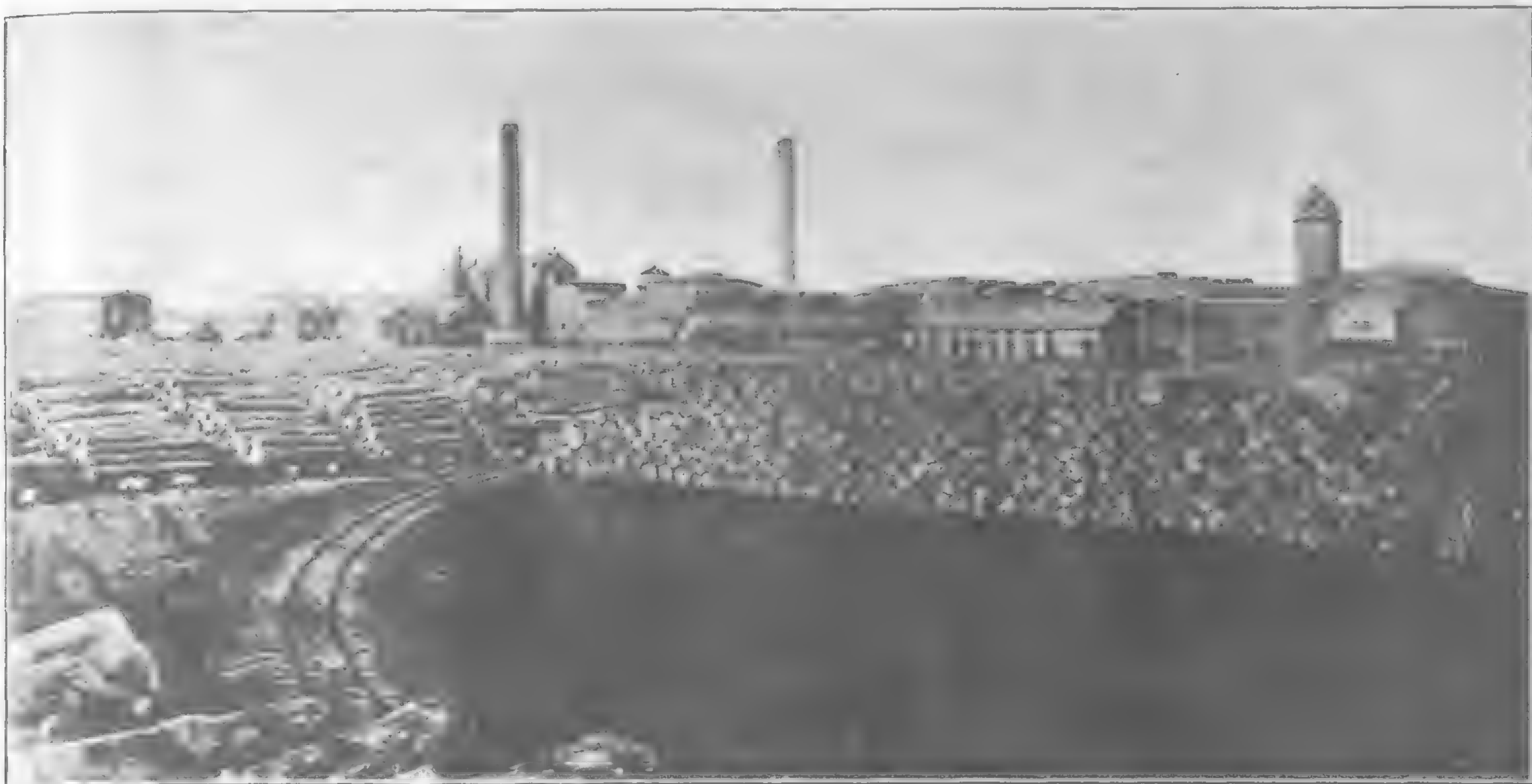
Four cabinet members and many men of highest standing in Pacific lands are preparing papers on these topics and it is expected that more than a hundred of the "key men" of the Pacific will attend the conference to further trade and commerce between Pacific lands.

Fuller will Build Dairen Hospital

THE contract for the design and construction of the Mantetsu General Hospital at Dairen, Manchuria, has been granted to the George A. Fuller Company of the Orient by the South Manchurian Railway Company. The hospital is to cost approximately Y.3,000,000 and its construction will require about two years.

The most serious problem faced in the construction of large buildings in Manchuria is the extreme cold winter weather, which prevents heavy construction during about half the year. The Fuller company has had considerable experience in putting up concrete and steel buildings in Canada, where construction has gone on when the mercury reached the extreme point of 40 degrees below zero, according to Mr. James Lee Kauffman, managing director of the branch company here, and with this experience it will inaugurate winter construction in Manchuria, where the temperature reaches that low mark.

Mr. H. A. Harris, managing director of the company, left for New York last Thursday to select the directing personnel for the work to be done in Dairen. Architects and structural and mechanical engineers will come at once to the Orient; to be followed by superintendents and foreign foremen. A staff of 16 or more foreigners will direct the construction and about 800 native laborers will be employed.



Oji Paper Company's New Mill at Tomakomai, Hokkaido, where 85,000 tons of news print paper is produced annually

The Development of a Great Industry

The Story of the Oji and Fuji Paper Companies

Oji Paper Manufacturing Co., Ltd.

IN 1872, the bureau of bank notes of the department of finance began to print bonds, notes and postage stamps, and a special printing section of the bureau was established. In order to supply the increased demand for foreign paper, the bank note bureau suggested to several private capitalists the advisability of building a factory for this purpose. As a result of this invitation, Jiroemon Mitsui, Saisaburo Shibusawa, Zenemon Ono, Hachiroemon Shimada, Junzo Saito, Risuke Minomura and Ichibei Furukawa promoted and organized the Shoshi Paper Manufacturing Co. in February, 1873, with a capital of Y.150,000. This was the parent of the present Oji Paper Manufacturing Co., Ltd.

In September 1874, construction of a mill at Oji village on the outskirts of Tokyo city, was begun under the direction of an English mechanical engineer, and an American paper expert. In December 1874, the capital was increased to Y.250,000, and by June, 1875, the Oji factory was completed, and commenced operations in August. In April, 1876, the factory was honored by an inspection by H.M. the Emperor Mutsuhito (the late Emperor Meiji) the empress, and the empress-dowager.

In the meantime, a branch office had been opened in Yokohama, where a general printing business was carried on and later a similar establishment was opened in Tokyo, in order to consume the output of the mill. About 1878 or 1879 the circulation of newspapers and other periodicals became so great that the company discontinued its printing business, and engaged exclusively in the manufacture of paper.

From 1885 and 1886 the demand for all sorts of publications far outran the supply of paper. The Oji Company increased its capital to Y.500,000 in March, 1887, and a second mill was built at Oji. At the same time a small mill was constructed in Shizuoka

prefecture, where low-grade foreign paper was manufactured from pulp produced in the district. With the enactment of the new company laws, the company changed its name to the Oji Seishi K.K.

The Sino-Japanese war which stimulated the growth of newspapers in Japan, resulted in a rapid expansion of the paper industry. The Oji Company increased its capital to Y.1,100,000 in February, 1896, to Y.1,650,000 in April, 1897, and to Y.2,000,000 in November, 1899. A large spruce and hemlock forest owned by four villages in Shimo Ina-gun, Nagano prefecture, was then acquired and a new mill built at Nakabe, Sakuma Mura, Iwata-gun, Shizuoka prefecture. Since January, 1899, the company has devoted its whole capacity to the production of printing paper.

Later in the year, however, it was found that the company had over-extended its operations, and it became necessary to reduce the capital from Y.2,000,000 to Y.500,000. Since then its business has steadily prospered. For the past five years dividends at the rate of 25 per cent. per annum have been regularly paid the shareholders, and in addition to Y.10,450,000 set aside as reserve, more than Y.11,000,000 has been written off for depreciation since 1912.

With the demand for news during the Russo-Japanese war, the domestic mills were unable to meet the paper requirements, and the Oji Company increased its capital to Y.6,000,000, and erected a large mill at Tomakomai-machi, Yufutsu-gun, Iburi province, Hokkaido.

This mill is operated by hydro-electric power which the company generates from the waters of Shikotsu lake, which never freezes in winter, nor dries up in summer, like many lakes in the Hokkaido. The timber supplies are purchased from the imperial household forests, and the government reserves. The mill is considered to be the finest in the Orient, from the point of quantity of production and supply of materials.

Since the Tomakomai mill started operations, the imports of foreign newsprint have been greatly reduced. The greater part of the

paper used by newspapers in Japan is now supplied from this factory. The company prides itself on the fact that H.M. the Emperor Yoshihito inspected the Tomakomai mill when he visited the Hokkaido in September 1911.

Pulp Manufacture

In July, 1914, the Oji Company doubled its capital, purchased the Mitsui pulp mill in Karafuto and changed its name to Otomari Kojo, in order to manufacture chemical pulp and eliminate its importation. With the outbreak of the European war imports of pulp were greatly hampered by the difficulties of transportation. The demand, however, increased tremendously, and a new factory was built in Toyohara-machi, Karafuto, in December, 1915, and called the Toyohara Kojo. The Imperial Paper Manufacturing Company's mill in Osaka was purchased in February, 1916, and renamed the Osaka factory of the Oji Company. In June of the same year the paper manufacturing plants of the government printing office were purchased and renamed the Jujo Kojo.

In May, 1918, the capital was increased to Y.25,000,000. In December, 1917, a subsidiary company called the Chosen Paper Manufacturing Company was organized with a capital of Y.5,000,000 at Madendo, Kojomen Gishu-gun, Heian Hokudo, Korea, to manufacture sulphate pulp, using timber from the Yalu river zone. It is the pioneer in this industry in Korea.

In order to separate the pulp from the paper manufacturing end of the business, the pulp mills of the Oji Paper Manufacturing Company were turned over to the Karafuto Industrial Company, Limited, in July, 1918, and capitalized at Y.5,000,000. This company's head office is in Otomari-machi, Karafuto. In the same month, the Oji Paper Company bought up the shares of the Yukosha Kabushiki Kaisha, which with a capital of Y.2,000,000 was engaged in the manufacture of printing paper at Kameido, in Tokyo prefecture.

In October, 1920, the capital was increased to Y.50,000,000, and in December of the same year took over the business of the Hokkai Industrial Company, capitalized at Y.500,000, with its main office and factory in Fushiki-machi, Toyama prefecture. It manufactures ground pulp and printing paper.

A change of policy was made in May 1921, and in August the business of the Karafuto Industrial Company, Limited, was purchased, and in December the Chosen Paper Manufacturing Company was taken over by the main company, and its capital increased to Y.51,000,000. The two factories are now called the Karafuto Bunkojo and Chosen Bunkojo.

During 50 years or since the company was organized, its capital was increased from Y.150,000 to Y.51,000,000, of which Y.31,500,000 is paid up. It is the largest paper manufacturing company in Japan, and also one of world-wide importance.

The officers of this company are: President and Special Managing Director: Ginjiro Fujiwara; Managing Directors: K. Takashima, N. Takata, K. Ogasawara; Directors: S. Ohashi, N. Ariga, K. Hayashi, J. Horikoshi, K. Inoue, T. Adachi and J. Tanaka; Auditors: S. Nakai, H. Nishimura, Y. Hirose and K. Iida.

The important enterprises of this company and their equipment are given below:

OJI MILL: Situated at Ojimachi, Kita Toyoshima-gun, Tokyo prefecture.

No. 1. Mill, opened, August, 1875; No. 2 Mill, March, 1880; No. 3 Mill, September 1817.

Site: 11,047 *tsubo* (36 sq. ft). Brick buildings, one and three stories.

Paper Machines: Two 98-in and one 84-in. Fourdrinier machines. *Power:* Electric, 1,200 H.P.; Steam, 450 H.P.

Raw Materials: Rags, rice straw, pulp, produced by their own mills and imported. *Products:* Hook paper: *Annual Production:* 24,000,000 pounds.

JUJO MILL: Situated at Jujo, Oji-machi, Kita Toyoshima-gun, Tokyo prefecture.

Site: 48,377 *tsubo*. Brick buildings, one and two storied. *Paper Machines:* One 100-in. and three 84-in. Fourdrinier machines. *Power:* Electric power, 1,340 H.P.; Steam, 740 H.P.

Raw Materials: Same as Oji Mill. *Products:* Book and post-card paper. *Annual Production:* 48,000,000 pounds.

OSAKA MILL: Situated at Zengenji-machi, Kita-ku, Osaka city.

Opened: November, 1914; purchased, February, 1916.

Site: 23,155 *tsubo*. Brick and wooden buildings, one and two storied.

Paper Machines: One 86-in. and two 74-in. Fourdrinier; One 96-in. and two 72-in. cylinder. *Power:* Electric, 2,732 H.P.; Steam, 345 H.P. *Product:* Book paper, cigarette paper, celluloid paper. *Annual Production:* 20,000-lbs.

KETA MILL: Situated at Keta, Keta-mura, Shuchi-gun, Shizuoka prefecture.

Opened: December, 1889.

Site: 16,968 *tsubo*. Brick and wooden buildings of one, two and three stories.

Paper Machines: One 78-in. Fourdrinier; one 72-in. cylinder. *Power:* Hydro-electric power, 488 H.P.

Raw Material: Spruce and a species of Hemlock known in Japanese as Toga. *Product:* Wrapping paper, match paper, etc. *Annual Output:* 7,000,000-lbs.

This mill also operates ground wood and sulphite mills producing pulp required by the paper mill.

NAKABE MILL: Situated at Sakuma-mura, Iwata-gun, Shizuoka prefecture.

Opened, January, 1899.

Paper Machines: One 88-in. Fourdrinier; one 72-in. cylinder. *Power:* Two steam engines, 35 H.P.; 6 turbine water wheels, 1,389 H.P. *Product:* Book paper, wrapping paper, etc. *Annual Output:* 9,000,000-lbs.

There are ground wood and sulphite mills manufacturing pulp required by the paper mill.

TOMAKOMAI MILL: Situated at Tomakomai-machi, Yufutsu-gun, Hokkaido.

Opened: September, 1910.

Paper Machines: Four 142-in., two 100-in. and two 98-in. Fourdrinier. *Power:* 16 steam engines, 2,880 H.P.; 3 water turbines, 1,210 H.P.; 4 Pelton water wheels, 1,800 H.P.; also uses electric power generated by other companies; operating 102 motors, 2,521 H.P.

Product: News print paper and wrapping paper. *Annual Output:* 150,000,000 pounds.

Attached to the paper mill, there is a large and up-to-date plants manufacturing the necessary quantity of ground wood and sulphite pulp.

SULPHITE PULP MILLS: The company operates three sulphite mills in Karafuto (Japanese Saghalien). Easy bleaching sulphite is turned out by these plants, comparing favorably with products of any first-class Scandinavian mill. The **THREE STAR BRAND** is well known in Japan and abroad.

ODOMARI MILL: Situated at Odomari-machi, Karafuto. *Product:* Easy bleaching sulphite pulp. *Annual Output:* 10,000 tons.

TOYOHARA MILL: Situated at Toyohara-machi, Karafuto. *Product:* Easy bleaching sulphite pulp. *Annual Output:* 20,000 tons. Wrapping paper. *Annual Output:* 6,000,000 pounds.

NODASAM MILL: Situated at Odasam-mura, Karafuto. *Product:* Easy bleaching sulphite pulp. *Annual Output:* 10,000 tons.

HYDRO-ELECTRIC ENTERPRISES: The Oji Paper Manufacturing Co., Ltd., also owns and operates five power stations generating 38,000 H.P. Power required by the paper and pulp mills at Tomakomai is supplied at low cost by these plants and what is left over is sold to different concerns for manufacturing and lighting purposes.

SUBSIDIARY COMPANIES: There are two subsidiary companies, whose operations are controlled by the Oji Paper Manufacturing Co.

KABUSHIKI KAISHA YUKOSHA, TOKYO: *Paper Machine*: One 60-in. Fourdrinier. *Product*: Book paper. *Annual Output*: 3,000,000 pounds.

HOKKAI KOGYO KABUSHIKI KAISHA, FUSHIKI: *Paper Machine*: One 100-in. Fourdrinier. *Product*: News print paper. *Annual Output*: 12,000,000 pounds.

The general office of the Oji Seishi Kabushiki Kaisha is at No. 9 Shinsaiwaicho, Shiba-ku, Tokyo.

Fuji Paper Manufacturing Co., Ltd.

The Fuji Paper Manufacturing Company was promoted in 1881 and on the advice of an influential government engineer it was decided to build a factory at the foot of Mt. Fuji where water supply and communications were good. This plan, however, had to be given up because of the financial depression due to the fall in the value of bank notes.

Shortly after this Ichiro Murata, one of the promoters, went to America to study the paper industry, and in August, 1887, returned to Japan and was able to interest the late Zensaburo Yasuda in his project. The Fuji Paper Manufacturing Company established in November, with a capital of Y.250,000, was the result. A building was constructed at No. 1 Itchome, Sanjikkenbori, Kyobashi-ku, Tokyo. It still remains the main office of the company. During the years of its operation the capital of the company has been increased eleven times, as shown in the following table:—

November, 1887..	..	..	..	..	Y.250,000
May, 1889	..	..	..	..	500,000
January, 1891	..	..	..	..	1,000,000
January, 1894	..	..	..	..	1,500,000
July, 1897	..	..	..	..	2,300,000
April, 1906	..	..	..	..	4,600,000
December, 1906	..	..	..	..	10,000,000
November, 1916..	..	..	..	..	15,000,000
February, 1917	..	..	..	..	21,000,000
March, 1919	..	..	..	..	24,100,000
December, 1919	..	..	..	..	35,150,000
June, 1922	..	..	..	..	37,550,000

The last capital increase in June, 1922, was made as the result of a merge with the Chemical Pulp Company, Limited, by which the Ochiai Factory in Karafuto came into possession of the Fuji Company.

The original Fuji factory was completed in 1889 and all kinds of paper manufactured. In 1897, the second mill was completed and placed in operation, and shortly after the Hokkaido Pulp Manufacturing Company was purchased and called the No. 4 factory. The business was so carefully directed that in 1891 the imperial household became one of the large shareholders in the company.

In 1908, after Mr. K. Ono became president, a mill was completed at Yebetsu in Hokkaido, and in November, 1915, the Shimoda Paper Manufacturing Works in Hyogo prefecture was purchased and called the Kanzaki Factory. A little while afterwards the Asahigawa Electric Company in the Hokkaido; was purchased and operated as an independent electric enterprise, supplying power to the company's factories, as well as to the general public. In October, 1917, a new pulp mill was completed at Ikeda in the Hokkaido.

The importance of the pulp industry had become so great by October, 1918, that a new company called the Fuji Pulp Company, Ltd. was organized to take over the Ikeda factory. In May, 1919, the Hokkaido Industrial Company was purchased and its factory called the Kushiro Factory.

At the present time the Fuji Paper Manufacturing Company owns the following mills:—

Fuji No. 1 Factory	Shizuoka Prefecture.
" " 2 "	"
" " 3 "	"
Shibakawa Factory	"
Kanzaki Factory	Hyogo Prefecture
Senju "	Tokyo Prefecture
Ebetsu "	Hokkaido
Kanayama "	"
Kushiro "	"
Ochiai "	"

Besides these, the Edogawa factory which has been under construction is nearly finished; the factory will be opened to business before long.

The officers are: President and Director: Heisaburo Okawa; Special Managing Director: Yohichi Anamizu; Managing Director: T. Takahashi; Directors: K. Suhara, K. Ono, E. Tanaka, K. Kumazawa, R. Ono and U. Tsukagoshi; Auditors: H. Sato, K. Koike and S. Wakao.

Machine Tools in Chinese Shops

By Sam Dean, Peking, China

MANY Americans do not know that there are in China several Chinese companies which make good gap lathes, drill presses and planers for rough work, and make them so cheaply that they supply practically all the repair shops of the country. Only the larger shops such as the railway shops have foreign tools, and these are mostly equipped with English machines.

There is a large and increasing demand in China for machine tools of the repair shop type, but the Chinese have to be educated to the fact that one good foreign tool is worth several cheap Chinese made machines. Perhaps the most popular American machine tool here is the lathe. This is rather too light for the work it is made to do, but accuracy doesn't matter on the jobs put through in most cases so it does fairly well.

The expensive machines with gear boxes, electric drives and all that are quite outside the present demand and pocket book. Now and then a large mill will buy good machine tools, but there

are comparatively few such mills. However, every city now has an increasing number of small machine shops and this is the trade which has volume and now uses Chinese and Japanese goods. These shops are run in many cases by graduates of Chinese technical schools and Chinese technical schools are mostly equipped with Chinese or Japanese, or at most English made or German, made tools. Naturally the students buy for their own shops what they have learned to use. Also the schools with their small incomes buy the cheapest machines.

Personally, I feel that there are two lines which American machine tool manufacturers could follow in order to get the Chinese market. One is to put their tools in technical schools out here at prices that would enable them to be bought, rather than shoddy Japanese or Chinese machines. The other is to find out the companies that are supplying the Chinese repair shops with machines and in these shops at least work hard to put in American machines. I doubt very much whether we can compete with the Chinese made machine for the makeshift repair shop, but we certainly ought to be able to furnish the machines that make China's machine tools.—American Machinist.

Menace to Travel in Manchuria

Train Wrecking as a Pastime or a Policy?

BENEATH the sedate exterior of the South Manchuria Railway, an important link of the world's highway of travel, there lurks a treacherous demon, looking for a chance to tamper with the railway traffic to the serious menace of life and property, says a recent official report on the wreck of the south-bound express.

This is highly regrettable, but, with all the efforts of the railway authorities, the hopes of the traveling public to eliminate these menaces may be slow to be fulfilled.

In fact, interferences with the South Manchuria Railway traffic have been attempted with annoying frequency, but such attempts have in most cases been frustrated through the joint co-operation of the railway people, the police and the Japanese railway guard.

None of the dastardly plots to interfere with the railway traffic has been so ingenious in conception and in execution as the fatal train wrecking that occurred between Mukden and Wenkuantun, a way-side station just north of Mukden, on August 14th, 1922.

The wreckers went about their business that time with a scientific dexterity.

It is significant that robbery was plainly not the object of the wreckers, for no passengers were molested, though the first and second-class coaches were brought to a standstill in a lonely district in the pitch dark of late night.

How the Wreck Took Place

The south-bound express train leaving Changchun at 5 p.m. on August 14th and due at Mukden at 11.20 p.m. passed Wenkuantun station at the scheduled hour and was rounding a gentle curve at 407.650 kilometres north of Dairen, when, with a strange sound, the train shot sideways about 70 metres; the locomotive with two third-class passenger cars were overturned; the dining car, together with two first and second-class cars, were also derailed, but were only tilted.

The Japanese stoker was burnt all over the body by the hot water of the boiler and was killed on the spot; the Japanese driver got burnt in both legs and face and died in hospital; the Chinese help was also burnt sustaining light injury; in addition, one of the dining car attendants and two of the passengers were slightly injured.

That the two sleeping cars and the mail car attached to the train escaped scot free, and that the injuries to the passengers were only nominal were owing to the Japanese driver's caution in his knowledge that that particular section is exposed to interferences by mischief makers. No sooner than his car caught the strange

sound; he at once brought the emergency brake to play. But for his presence of mind and loyalty to his duty, the consequences to the passengers would have been too terrible to contemplate, especially as the train was then running at the speed of forty miles an hour.

There has never been a shadow of doubt as to the object of the train wreckers. Their sole aim lay in interfering with the train traffic. The point, at which the wreckage took place, was in a curve. All the six bolts of the outside rail, together with all the spikes for about half the rail, had been found removed. Besides, all the bolts for the adjoining splice, too, were found loosened.

The fact that the outer rails in the bend were chosen, coupled with the fact that the work was done in the space of forty minutes between the time of the last patrols going their regular nocturnal round and the time of the express train to pass the point, indicate that such a feat could not be accomplished by a group of men not fewer than ten, equipped with some amount of technical knowledge and experience.

Instances of interference with the track and theft of

accessories on the South Manchuria Railway lines have been many, especially about Mukden, as may be shown in the list.

1922. January 5, Hunho-Mukden, 395-396 kilometres from Dairen, 2 pieces of telegraphic copper wires (80 metres) stolen; January 17, at km. 394, 100 metres of wires stolen; February 10, kms. 405, spikes driven into the space between rails at the joint; March 7, km. 403, a stone weighing about 42-lbs. laid on the track; March 28, km. 403, come thirty small-sized stones laid on the track; April 5, km. 405, while a detail of railway patrols was on one of their rounds, they noticed three Chinese soldiers and two Chinese coolies placing a couple of stones weighing 25-lbs. or so. The coolies were captured and the Chinese soldiers were called upon to explain. They were going to be taken to the guards' box when about 70 or 80 Chinese soldiers gathered and attacked the Japanese soldiers and went away. April 14, km. 400, about 30 small stones were placed on the rail track. April 16, near km. 400, about 15 small stones laid on the rail; July 17, near km. 406 (between Mukden and Wenkuantun), small rocks laid on the rail; July 18, near km. 404, small rocks laid on the rail and some Chinese soldiers were noticed looking on. August 2, near km. 395 (between Mukden and Hunho), 36 kilogrammes of telegraphic copper wire stolen; August 14, km. 407, train derailed with fatal results as above stated. August 23, km. 400 (at level crossing), as train No. 44 was in motion, a stone of the size of a man's fist was thrown at the train by one of a group of seven or eight Chinese, the window pane of the caboose car was smashed, and the conductor injured.



All the six bolts of the fish-plate, together with all the spikes for half a rail length were found removed and the bolts on the next fish-plate loosened



A Street in the French Concession at Tientsin; Russian Church in the distance

Tientsin's Native Industries

The Turning Point of Chinese Industry

By O. D. Rasmussen

WORLD economics of the past four years, the rise and fall of silver, the piece goods crisis, the attempted boycott of Japanese goods by Chinese in 1919 and 1920, and kindred politico-commercial difficulties, have served to effectively bring home to the Chinese their dependency on foreign supply for the satisfaction of their daily needs.

The realization of this unsatisfactory state of affairs, and its utilization in bringing about a new outlook towards native economics may be said to have formed a turning point in the history of Chinese industry. The failure, either by lack of materials or by excessive prices, of European and American sources of supply, because of disturbed financial and labor conditions, has revealed to the Chinese, forced to fall back on their own resources, how inadequate their own industries have been to meet the requirements, in quality, quantity and design, of the home demand.

Chinese manufacturers, financiers and business men, aware of the opportunity of wealth in the productive field of native manufacturing, lost little time in translating it to action. Now one sees on every hand indications of increasing volume of native manufactured goods, of old factories regenerating and of enlargements, extensions and of a general industrial expansion. The native and a few foreign stores now stock such diverse manufactures as silk stockings, dolls and tennis rackets, cigarettes, soap, matches and electric fittings, manufactured by Chinese factories by entirely native supervision, materials and labor.

The executive and constructive brains of the country are now concentrated, not upon the age-long effort to amass money and increase private riches from existing wealth, but upon the production of new wealth from the manufacture of goods to meet wants arising out of the rapidly rising standard of living.

The study of native industry is encouraging. It refutes the argument that Chinese are not capable of organizing and administering an efficient business institution. Of the few factories brought under observation, there are signs that their organization has to contend with unnecessary depreciation of machinery, through lack of intelligent operation by workmen, but apart from this, which will be taken care of by the growth of a skilled and educated mechanical class, there are no indications that Chinese manufactures are not destined to reach a high standard in the world's products.

At the time of writing the government bureau of economic information announces that the ministry of agriculture and commerce has circularised the provincial industrial commissioners that it has decided to issue certificates of merit to Chinese manufacturers on conditions that their product must be: (1) a new invention, (2) manufactured from native raw material, and (3) of a quality similar to that of foreign importation. This is obviously a step in the right direction and shows quite distinctly what the Chinese have for their goal.

As regards the position between capital and labor there is not the same encouraging outlook. The situation claims much more treatment than can be given under this head, but it will suffice in this connection to refer to general conditions as they reflect upon the native industries.

Advance in the status and environment of laborers has not kept pace with the development of machinery. In fact, in the main, it might be said that no advance whatever has been made in the large majority of factories. Hours, wages and surroundings are still on the primitive native basis. They form the nucleus of a future struggle between capital and labor, and are identical with conditions fifty years ago in foreign countries, where the conflict is now at its height.



Handsome new Buildings in Tientsin; Office of Fearon, Daniel & Co. at Right

While manifestations of unrest are not apparent in these native factories, there still exist the factors which form the roots of trouble, factors which, when seized upon by propagandists of the type of bolshevist now strongly entrenched in Shanghai and Peking, are capable of unlimited magnification.

The Chinese capitalists, if we can class them as such, are not conscious of exploiting human labor, as foreign lands have come to recognize it. They hire and accommodate laborers after the custom and fashion peculiar to each individual craft, with no particular reservations or limitations not common to all engaged in that trade. Standards of living and factors which bear upon them are not the same in all parts of the country. In Shanghai the price of rice is most important, whereas in Tientsin and neighborhood rice is not the principal staple, and its fluctuations make scarcely any appreciable difference in the cost of food.

But while not committing intentional exploitation, nevertheless the Chinese, and the foreign employer as well, are omitting efforts to ameliorate the conditions. A large problem of economics surrounds this question, but reduced to simple terms it means that the

duties of which should be to collect and analyse statistics of conditions facing both workmen and employers. It should be able, among other things, to form commissions of inquiry into cur-

rent disputes and be at the service of all *bona fide* inquirers, for a nominal fee, in connection with growing problems. Out of its findings and experience might come the nucleus of comprehensive labor legislation, concerning hours, wages, child and woman labor, factory conditions, hygiene, sanitation and allied conditions.



Raw Cotton for the Busy Mills at Tientsin

Cotton Yarn

THE YU YUAN FANG CHIH KUNG SSU, located just outside the ex-German concession at Hsiao Liu Chuang, was established in 1916 and commenced work in March, 1918. It originally was part Japanese but now it is said to be entirely Chinese owned, and is capitalised at \$3,500,000 Chinese currency, the estimated cost of present buildings and plant being about \$3,000,000. The machinery is entirely American (Saco-Lowell) purchased through Andersen, Meyer & Company. The mill runs 50,000 spindles with 50,000 more to be added next year. Just at present



The New Heng Yuen Textile Mill at Tientsin, equipped by Andersen, Meyer & Co. with American Machinery

onus of raising the standard of living is on the employers. It rests upon their initiative to raise the selling price, reduce profits to a fair minimum and keep wages on a fair living scale. It is easy to write it, we are aware, but, sooner or later, the problem has to be faced, and it cannot be too soon to keep pace with swiftly moving events.

Chinese labor conditions are low, but they have been on a par with the Chinese living costs. They can move only in one direction and that is upwards. Intelligent anticipation will avert catastrophes, which the kindergarten industry of China cannot well afford to meet, and intelligent foresight can come only from those prepared and able by virtue of education and wealth to exercise it. If employers wait for labor to extort what they feel to be a reasonable portion of capital to pursue their right to happiness, the toll will be higher.

China needs, almost above anything else at the present time, a bureau of labor, the

25,000 spindles are working day and night with an average output of 24,000 pounds per 24 hours, single thread, 16s. and 20s. The raw cotton used is entirely native which, because of the shortness of fibre and coarseness, produces a hard thread.

The factory employs about 1,400 hands of whom 1,000 are boys between the ages of 13 and 17 years. There are two shifts of 11½ hours each; no Sunday work. The average boy's wage is 20 cents a day, and a man's wage averages about 40 cents. The chief engineer is Japanese. Practically no women are employed as Tientsin women are inexperienced and feel mill work to be a disgrace.

Good housing is furnished for those who wish it in the Chinese village in an enclosed compound outside the mill. A doctor is on the regular staff, and a small hospital has been erected. This mill is modern in every respect, and factory conditions under which



Chinese Brick Kiln on the Hai-ho

the laborer works as a whole are good in the matter of sanitation and light.

THE HUA HSING FANG CHIH KUNG SSU was erected in North Tientsin (Ho Pei) in 1917-1918 and commenced operations in January, 1919. It is equipped with 25,000 spindles (Saco-Lowell) through Andersen, Meyer & Company and produces yarn from 10s. to 20s. similar to that of the Yu Yuan Textile Company. The average output is 25,000 pounds per day. The mill employs about 1,600 workmen in two shifts of 12 hours each—one change of shift per week. Women employed number about 700 brought from Shanghai. Boys employed number about 200. A statement of wages was not obtainable, but they may safely be estimated at a little more than those paid at the Yu Yuan mill as it was stated that no housing is provided. The mill contemplates installing cloth weaving machinery. Conditions here are not so good as at the Yu Yuan, the mill not even stopping during the meal hours, neither are the buildings as well lighted nor kept as clean.

THE HENG YUAN FANG CHIH KUNG SSU, Ho Pei, Tientsin.—Machinery is from the Saco-Lowell shops purchased through Andersen, Meyer & Co. It will manufacture 8s. to 20s. yarn. The capitalization is said to be \$3,000,000 and the factory is quite up-to-date in every respect.

Tientsin's Chinese Industries Cotton Cloth

All cotton cloth weaving establishments in Tientsin are run by man power, and as such they range from one or two looms (native and Japanese make) in a house to 50 or 60 in so-called factories with hired labor or apprentices. There are from 100 to 150 such weaving establishments, but none of them are factories in the modern sense. Ho Chia Ho—that small section of the native city between Ku I Chieh and the Yu Ho—is the location of a great number of them, every hutung and lane displaying numerous imposing signs, and the air resounding with the hum of flying shuttles and blatter of looms from small Chinese buildings behind the walls. Most of these factories also call themselves dyeing works, each one dyeing its own cloths and yarns and specializing in its own particular designs and qualities of cloth, although none have a monopoly of a particular style. Many of the products are excellent in coloring, design and quality considering that they are made by man-power looms, and compare very favorably with foreign machine-made products. These native cloths include coarse and fine nankeens dyed in the piece, grey shirting, colored shirtings dyed in the thread, imitation ticking, figured cottons, bed cover-

ings, cloths with crimp designs, drills, canvas selling by weight, mercerized cloths woven from foreign cotton and rhea thread, and brocades with as good a finish as a foreign-made product.

One of the largest of these establishments is the CHUNG HUA SHIH YEH CHIH JAN KUNG CH'ANG, established seven years ago, capital \$20,000, with three factories, one for dyeing and two for weaving. These factories are typical Chinese houses, poorly lighted, dirty and with earthen floors. There are 150 workmen employed. Wages are paid by the piece, although in some of the other establishments wages are paid by the day or month, housing and food being included or excluded according to circumstances. In this particular factory an average wage of \$0.50 a piece of 21 yards is paid, weavers of plain cloths getting a smaller wage than those weaving fancy cloths. A good workman will weave one piece of ordinary designed cloth a day. Hours of work are not fixed but average 12 per day.

A market for this factory's product is found as far south as Shanghai and Nanking.

THE I CHANG FAN PU KUNG SSU specializes in canvas. It was established in 1913, capital \$100,000. The factory proper is a large room, Chinese style, well lighted, brick floor, cleaner than the average factory, and efficiently managed, 300 apprentices, most of them boys, are employed with housing and food provided. Wages are paid by the piece in excess of 320 yards per month. The working day is 12 hours. The cotton canvas produced is of good quality.

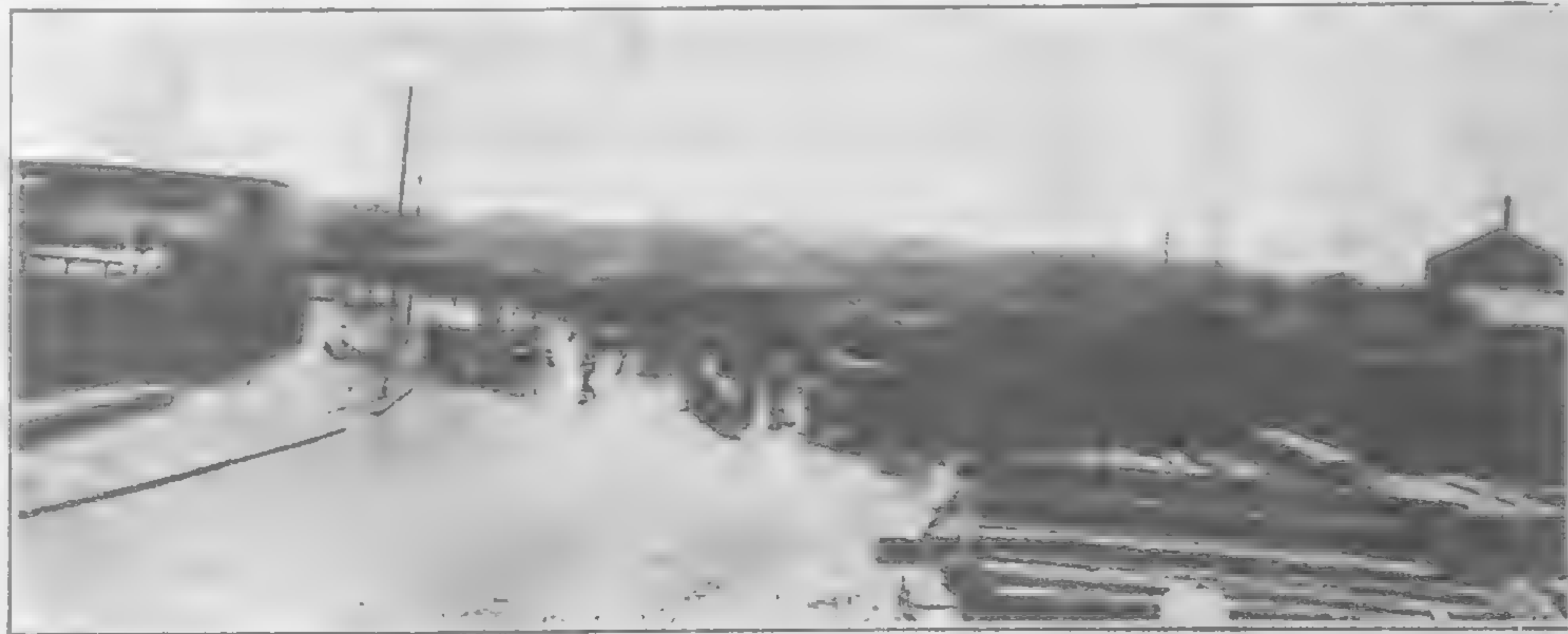
Match Factories

There are two large Chinese-owned match factories in Tientsin, the TAN HUA HUO TS'AI KUNG SSU and the PEI YANG HUO TS'AI KUNG SSU. The latter was built in 1906 and now operates two factories, the original one on the banks of the Yu Ho and the new one, built in 1914 at Nan Kai. The total number of workmen employed is about 1,350. Of these, about 1,000 are outsiders and 350 live on the premises with food provided. There are 12 hours of work a day; the average wage is 30-50 cents; half-day's holiday on Sundays. Rest hours during the working day are from 8.00-8.30 a.m., 12.00-1.00 at noon, and 4.00-4.15 p.m. A number of women and girls are employed in packing the match boxes. Chemical materials come from abroad; match splints from Japan and Manchuria.

Two grades of matches are made, a first quality which is a safety match, and a second quality which is not a safety match but which is in popular use among the Chinese because of its cheapness—about seven cash per box of about 150 matches. The machines used are Japanese made and are run by



Native Loom, Tientsin



Lumber Yards in the Italian Concession, Tientsin

man power. Conditions of labor are dangerous and very unhealthy. The factory is poorly constructed; ventilation to carry off the strong fumes is poorly arranged; and there are few safeguards against fires (matches constantly ignite and the fires are extinguished by small boys with brooms). Most of the workmen are boys and young men.

In spite of bad laboring conditions in the factory itself, the Chinese homes in the vicinity of the mill are an improvement over the average lower class home seen in China and reveal a higher standard of living.

Glass Factories

THE MING CHING PO LI KUNG SSU began operations in August, 1919, in answer to the demand for window panes of non-Japanese manufactures, a great deal of the local demand being met by Japanese products from Shantung. This factory at present has an output of 40 cases per day to be increased later to 60 cases per day, each case containing 100 square feet of window-glass of good quality,—three colors, blue, green and white. Manufacture of other kinds of glassware is not contemplated. The present product is selling at \$14 to \$16 per case. The factory is poorly constructed—typically Chinese:—there are two work shifts of 10 hours each; no Sunday work; 30 skilled workmen from Shantung; wages \$30 to \$60 per month.

THE TA HSING LIAO CH'I KUNG SSU began operations in 1912; capital; \$6,000 and for some years produced only lamp chimneys, bottles, globes, etc. In the fall of 1919, it also began to make window glass. There are about 150 workmen employed; of these, the window-glass blowers come from Shantung and command wages of from \$10-\$50 per month, 10-12 hours work per day, most of them boys, are local men, and work longer hours with wages running from \$10-30 per month. Food and housing are provided. Factory conditions are bad. The glassware produced is not of very good quality as compared with a foreign product from America and England, but it is cheaper and better than Japanese-made goods of the same class. In addition to the above factories, there are the Kung Chi Po Li Ch'ang Li, West Tientsin, and the Chung Li Liao Ch'i Ch'ang, established in 1913 at Ho Pei but at present not working. A new window-glass factory, the Pei Yang Po Li Kung Ssu, is just in process of erection at Ho Pei.

Egg Products

YUNG CHI TAN CH'ANG and TA HSIN TAN CH'ANG.—The prepared egg industry in this district was started several years ago and was in a flourishing condition up to 1918 when it was for a time affected by various food laws of several importing countries, particularly America. In 1917, over five million pounds of egg albumen and yolk, dried and moist, were exported from Tientsin, and in 1918, only two million pounds. On the other hand fresh eggs increased in export by five and one half million pieces over that of 1917. The American food laws rule that dried egg products containing more than one hundred milligrams of metal to the kilogram cannot enter the United States; and when the dried egg industry was first promoted in the Far East, at the advice of German firms, all plants were equipped with trays and drums for drying purposes made of zinc as this is practically the only metal which does not impart a color to the dried product. In the process, however, of drying the eggs, the ammonia used tended to eat the zinc pans in spots, and in removing the dried product by scrapers a portion of the metal came with it. The new method of drying eggs was then introduced by means of "spraying" or blowing the egg in fine spray into a heated chamber. The resulting product is free from metal and the various egg plants which are largely in the hands of Chinese are gradually converting their establishments into spray plants, the initial cost of installation amounting to about \$15,000.

There are only two Chinese-owned egg factories in Tientsin—the Yung Chi Tan Ch'ang at Pei K'ai and the Ta Hsin Tan Ch'ang at Ho Pei. These factories use both methods and turn out a very good product. The most important Chinese-owned factories are

located in the interior—Paotingfu, Shihchiachuang and Honan province.

Asbestos

THE TIEN CHING SHIH MIEN KUNG SUS (Tientsin Asbestos Joint Stock Company, Ltd.) was established in 1915 in the British concession. The factory—a group of Chinese houses converted into workshops—cannot be said to be as imposing as the name would lead one to suppose. No foreign machinery is used, mill boards, etc., being made by large hand presses, and the various yarns and ropes being woven by hand power weaving machines locally constructed from Japanese models. Besides various products used by factories, the concern turns out pillows stuffed with asbestos waste—a type of pillow very popular with the Chinese. A very good mineral is imported from Kwangtung in small quantities, but the greater part used comes from beyond the pass via Peking and from Manchuria. The product, hand-made as it is, compares favorably with the foreign machine-made varieties, is cheaper in price, and is used by various railway shops and factories throughout China. Workmen employed number 70-80. Of these a great number are apprentices with food and lodging furnished and wages of \$1 per month. The other workmen are furnished with lodging and command wages of from \$3-\$6 per month. The hours of work are 11 per day.

Furniture

There are numerous establishments in the foreign concessions ranging from small carpenter shops to large factories with from 50 to 60 workmen. These specialize particularly in foreign style furniture and are able to duplicate very cleverly anything given them; none of them have machinery, all work being done by apprentices and carpenters.

Bricks

There are no Chinese concerns making bricks and tiles by modern methods but there are a number which make these products by the old Chinese methods.

Soap

HO CHI TSAO I KUNG SSU, T'UNG HSING TSAO I KUNG SSU, SHUN I TSAO I KUNG SSU and T'EN CHING TSAO I KUNG SSU.—There are several native style soap-making establishments in Tientsin, among which the largest are the Ho Chi Tsao I Kung Ssu at Hsi T'ou, the T'ung Hsing Tsao I Kung Ssu at Hopei, and the Shun I Tsao I Kung Ssu also at Ho Pei. These factories use practically no machinery. The raw material is boiled and alkali added until it is saponified and then it is cooled and cut into strips and bars by hand. The only Chinese-owned factory using foreign machinery is the T'ien Ching Tsao I Kung Ssu located at Ho Pei. This factory was established in 1903 and made soap by the old methods. Foreign machinery from America was installed in 1913, products were exhibited at the Panama exhibition, and since 1915 a foreigner, a soap expert from Holland, has been employed only to supervise the scientific side and of soap making. When the factory is running at full capacity both the foreign and native vats are used. The foreign tank in which the soap is boiled by steam has a capacity of 15,000 pounds, and a new tank is being installed with a capacity of 30,000 pounds. It is also planned to extract glycerine. The factory at present is held up by lack of perfumes which in the past have been purchased in Japan, but which in future on account of the boycott are to be obtained direct from Europe and America. Both washing and scented toilet soaps are made, all of very good quality. Water for the plant is brought from the river and filtered on the premises. The product finds its entire market in Tientsin and North China. The factory running full capacity (when it turns out about 3,000 pounds per day) employs from 80 to 100 workmen. The average working day is 12 hours. Housing and food are provided on the premises. Ap-

(Continued on page 619)

A Model Power Plant

An Allis-Chalmers' Installation at Wusih

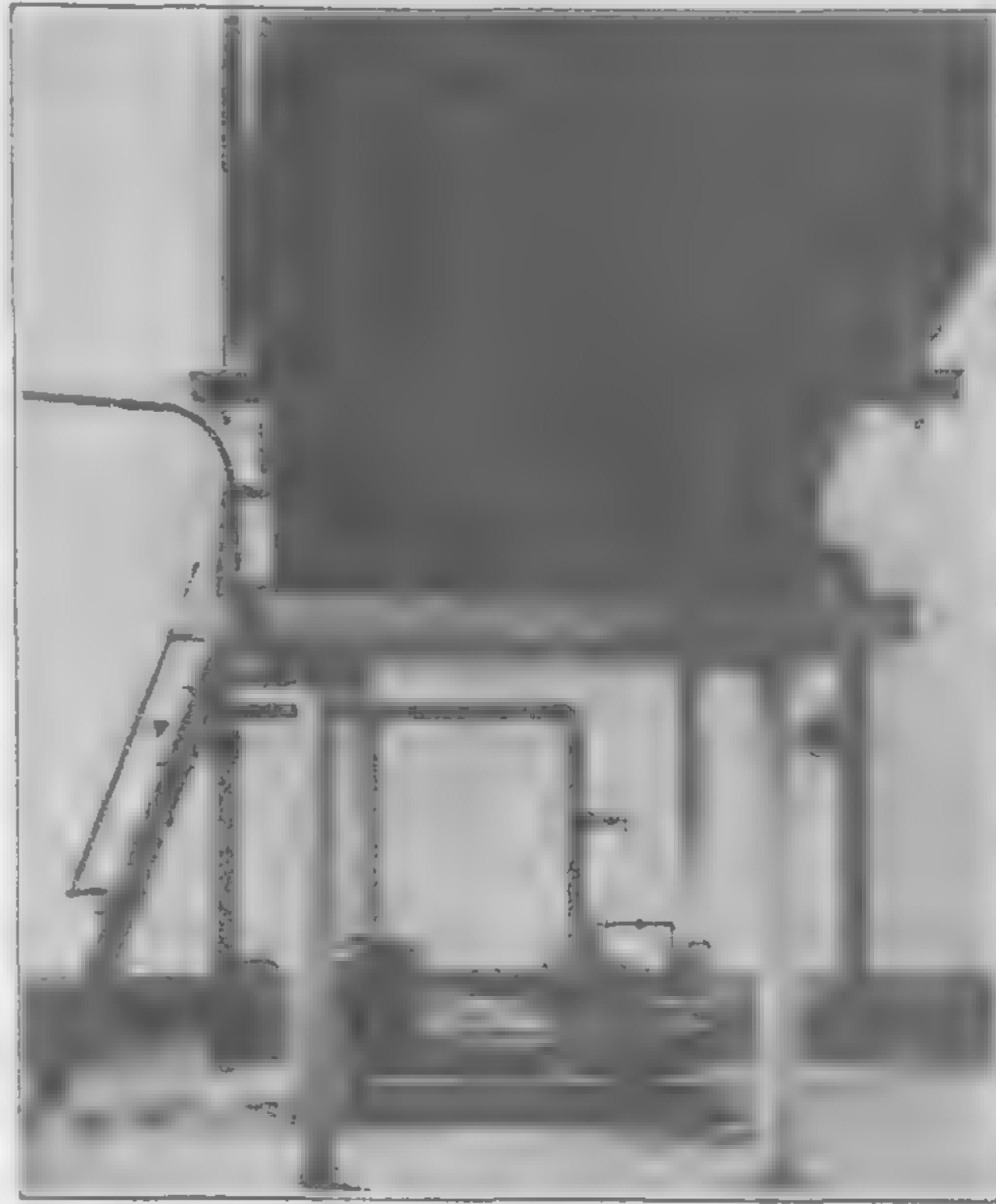
ONE of the most up-to-date central electric power plants recently erected in China, is located on the Grand Canal outside the west water gate at Wusih, the growing industrial centre in Kiangsu province on the line of the Shanghai-Nanking Railway. The plant is owned jointly by a group of industrial enterprises controlled by

alternators with direct connected exciters, operating under a steam pressure of 200-lbs., superheated 200°, generators 2,000 k.v.a., 50 cycle, 2,300 volts, 3,000 r.p.m., power factor, 80. Low-tension voltage for lamps, 220 volts and for power 350 : three phase, three wire system. The turbines are of the Parsons type operating under a vacuum of 28 inch. The turbine room is equipped with a ten-ton traveling crane operated by hand. Each generator is equipped with an air washer capable of washing 10,000 cubic feet of air per minute, the washing medium being water, insuring a constant supply of air free of dust and practically at a constant humidity.

There are two C. H. Wheeler surface condensers of 2,500 sq. ft. heating surface each equipped with Radojet air pumps and circulating and condensing pumps. The circulating pump is driven by a 50 h.p.



Power House



Air Washer

Mr. T. K. Kung and supplies light and power for the Shen Hsin Cotton Mill No. 3, the Mow Sing Flour Mills Nos. 1 and 2 and to a new 500 loom weaving mill now under construction.

The plant was started in January of this year, under the management of Mr. Doo Ah-sing, who is also chief engineer. The contractors were the American Trading Company who supplied Allis-Chalmers generating equipment, while the boilers were supplied by Jardine, Matheson & Company. The plant was designed and erected by Mr. G. C. Brown of the Allis-Chalmers engineering staff.

The steam generating plant consists of four Babcock & Wilcox water-tube boilers of 4,780 sq. ft. heating surface each equipped with mechanical stokers, using coal fuel with induced draft. The chimney is 185-ft. by 6-ft. There are two Weir vertical boiler feed pumps and two 1,500 h.p. Cochrane open type feed water heaters from the Harrison Safety Boiler Works, in which all the exhaust steam from the steam-driven auxiliaries and air pumps is utilized.

The power units consist of two Allis-Chalmers steam turbo-



Boiler Room: 4 B. & W. boilers, 4,780 sq. ft. heating surface each, mechanical stokers, induced draft.

AN ALLIS-CHALMERS' INSTALLATION AT WUSIH

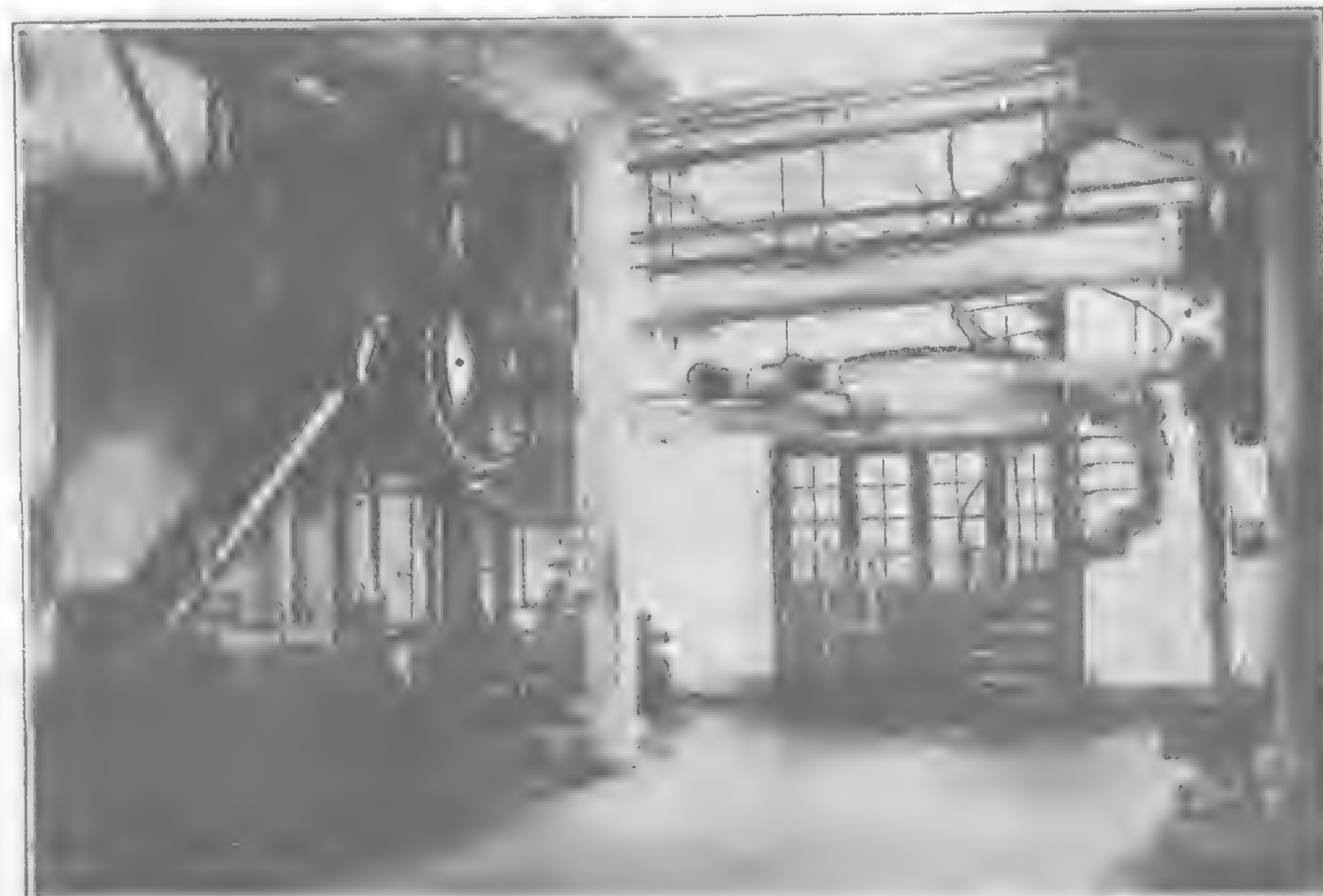
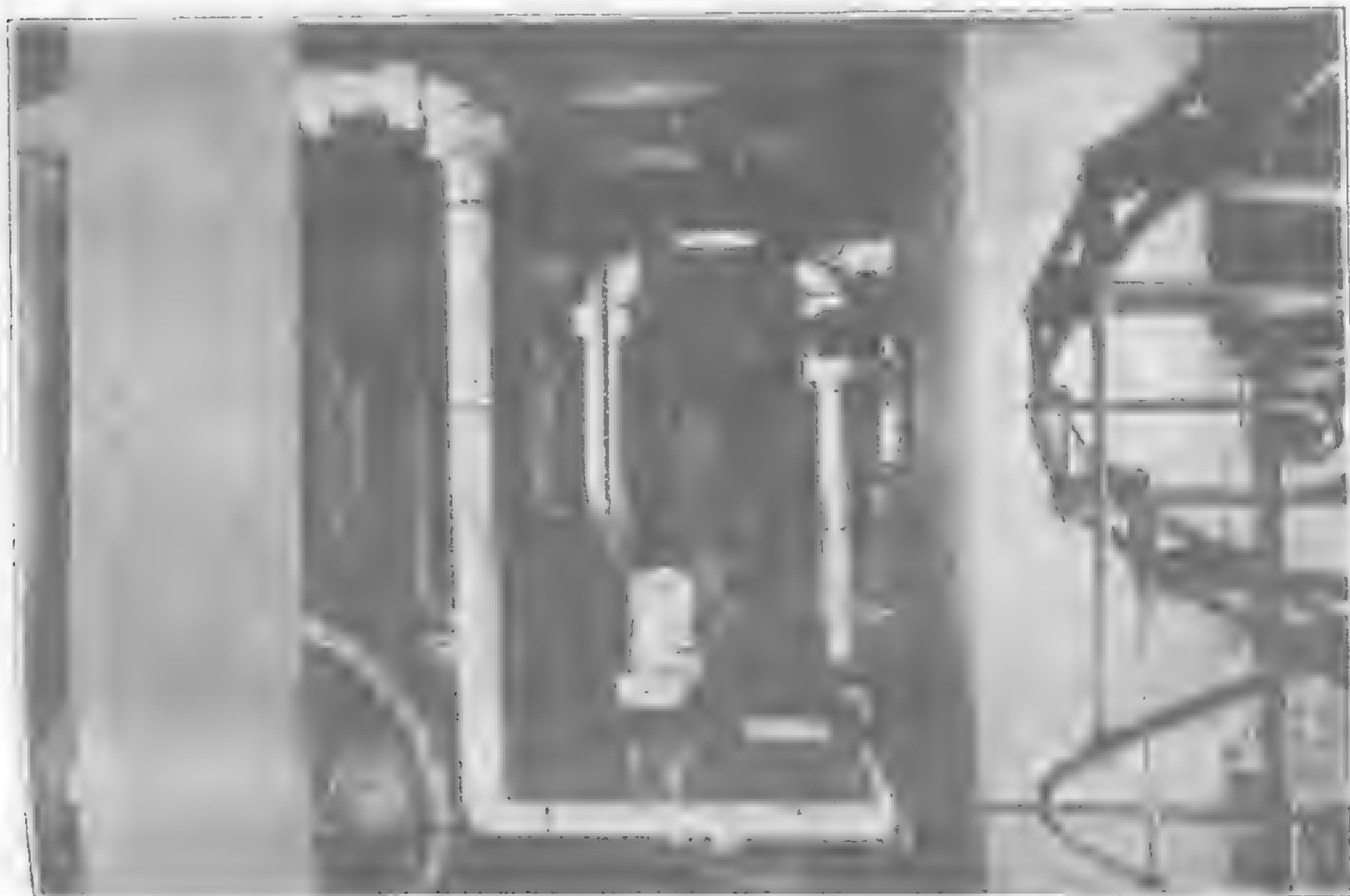
618

THE FAR EASTERN REVIEW

October, 1922



Two Views of Generating Room : Two 2,000 k.v.a. 3 phase, 50 cycle, 2,300 volts Allis-Chalmers Turbo-Alternators, 3,000 r.m.p. Power Factor 80



Views of Condensers : Two 2,900 sq. ft., C. H. Wheeler Surface Condensers : one Condensing Pump driven by 50 h.p. Terry Steam Turbine, the other by 50 h.p. Electric Motor

Terry steam turbine. The condensing pumps are installed in duplicate, one driven by a 5 h.p. Terry turbine and the other by a 5 h.p. electric motor.

The switchboard consists of a seven black slate panels. The first two for the generators one for each machine, the third for the house service through which is derived current at 350 volts from three 50 k.v.a. transformers in the condenser room for operating the motor-driven auxiliaries. The remaining four are the feeder panels for the substations at the mills. Allis-Chalmers transformers and switchboards are in use at the substations. The transmission line is carried overhead on concrete and wooded poles. A private telephone system with a capacity of 30 instruments was installed for communication between the chief engineer's office in the central plant and the several substations.

There is also one 500 gallon, 100-lbs. pressure, 3 stage centrifugal pump driven by an Allis-Chalmers steam turbine and one 500 gallon, 100-lbs. pressure single-phase centrifugal pump driven by an Allis-Chalmers motor, used to provide a supply of cold water through the house service line from which is taken all cold water for boiler make up, oil cooling water and centrifugal pump gland sealing water. When the power plant is operating at full capacity, 8,000,000 gallons of water per day of 24 hours are taken from the Grand Canal. A concrete intake was specially designed and is provided with a double set of stationary screens. These screens

are removable by means of an overhead A-frame rigging. The condenser water discharges into a small canal on the opposite side of the power house from the Grand Canal.

TIENTSIN'S NATIVE INDUSTRIES

(Continued from page 616)

prentices—boys—receive a wage of about \$30 per year. Wages of the other workmen average \$6 to \$15 and more per month depending on skill and kind of work. The factory impresses one as being very profitably and efficiently managed.

Ironware, Machinery

PEI YANG CH'UAN YEH T'IEH KUNG SSU and PEI YANG CH'UAN YEH T'IEH KUNG SSU; established in 1906 with a capital of Tls. 200,000. The iron comes from Hankow; the factory produces railroad materials, machinery and tools; 600 workmen are employed; the plant is British.

SSU EN CHI T'IEH KUNG CH'ANG, established at Tung Ma Lu, Native City, in 1907. Besides these there are a number of native foundries.

Greater Osaka Water Supply

A PLAN is afoot says the *Osaka Marnichi* for constructing an aqueduct to draw water from Lake Biwa to supply Greater Osaka in years to come. Should the plan materialise, it is expected that the volume of water supplied to Osaka will be 350 percent, of its present volume. Osaka then will be able to supply water to outlying towns and villages, should they so desire.

At present, the capacity of the reservoir at Kunijima is estimated at 2,200,000 koku per day. Osaka had anticipated that there would be enough water supplied to the city by the present system up to 1931. At the rate of the highest record of supply during the summer, this year, the full capacity is likely to be reached in 1926 or 7.

To Examine Water

The city has requested the Shiga Prefecture Meteorological Observatory to investigate facts about the water of Lake Biwa and its relation to meteorological conditions, while the examination of the quality of the water has been entrusted to Dr. Kwamura of Kyoto University. Experiments of filtering and sterilizing water are being made by Dr. Fujiwara of the city.

According to the new fourth period plan of waterworks maintenance, the full capacity of filtering will be 90 koku per second, that is an average of 7,770,000 koku per day. By means of machines, water can be filtered to the extent of from 400 to 1,000 cubic feet per day.

When that plan is completed, not only Greater Osaka, but also many outlying districts can be supplied with water. Already inquiries have been addressed to Kobe, Nishinomiya, Amagasaki, Takatsuki, Suita. Ibaragi and other cities or towns or villages, to ascertain if they desire water supply.

Even to-day, 18 towns and villages comprising a total population of 382,100 receive water from Osaka city. There are two towns or villages, with 18,000 people, where waterworks are being

constructed to get the supply from Osaka's system. Thirty four other towns and villages, with 155,000 people, have applied for water.

To Discuss Water Supply

The national conference of the municipal authorities regarding the water supply is to be held in the municipal assembly building of Nagoya for a week from October 2, and three officials concerned in addition to the head of the Osaka municipal sanitary investigation office have been appointed to attend. It is learned that in addition to all the cities in Japan proper, those of Manchuria, Chosen, and Taiwan are to participate in the conference. Many questions in connection with experiences, experiments, and investigations in the matter of municipal water supply will be tendered to the conference for discussion with a view to the improvement of supply systems.

Announcement by American Chamber of Commerce of China

From time to time, stocks in American oil companies are offered on the local markets of China. Full information as to the possibilities of all oil regions and fields in America can be secured without cost by addressing a letter of inquiry to the United States Geological Survey, Washington, D.C., a branch of the American government which has made a close survey of all possible oil fields in the United States and has on file complete data regarding same. When practical, a prospectus of the company marketing the stock should accompany the letter.

North Borneo—A Chinese Colony

By G. C. Irving

EVERYDAY we have reason to realize how little is known about the island of Borneo. Though the British North Borneo Company acquired its rights over its territory forty years ago and has succeeded in reducing the chaos of native rule to a condition of peace and safety, the country still remains but little known. It enjoys a reputation, even at so little a distance as Hongkong and Singapore of being unhealthy, unproductive and beneath the notice of the European capitalist. Actually it is a country with a moderate tropical climate and a generous rainfall capable of maintaining a large population.

More especially and to an eminent degree does this land of plenty provide an ideal existence for the people of China. They have lived and prospered for many years under the government of the chartered company and the only fault we have to find is that sufficient importance has not been attached to the policy of increasing the number of our Chinese colonists. The connection of the Chinese with Borneo dates back to the middle ages. It is a disputed point as to whether the Chinese ever settled in any numbers for there is little reliable evidence of their having done so, but they traded extensively around the coasts of the island and were on friendly terms with the sultans and chiefs.

When in 1882 the northern part of Borneo passed by treaty into the possession of the chartered company, what trade there was soon came into the hands of the Chinese who settled in Kudat and Sandakan. When the country became safe for the development of large estates, particularly tobacco and coffee, the managers

relied entirely upon China for their supply of labor. Medical science was not then what it is to-day with the result that the Chinese contracted fever and other diseases which carried them off in large numbers. No one seemed to worry very much over a high death rate among these unfortunates. The supply of labor was more than equal to the demand and regular supplies of new material were continually coming down from Hongkong. The coolies were placed under a stiff indenture, badly paid and allowed to feed themselves as they liked. Beri beri, the worst scourge of the country, stalked unchecked among the estates and was regarded as incurable and unpreventable.

country, stalked unchecked among the estates and was regarded as incurable and unpreventable.

We do things differently in these enlightened days. Managers regard their labor as their best asset, none but the physically fit are accepted and, once included in the estate labor force, are fed and housed in such a way that the present day sick rate is far below the old death rate. The old indenture has been done away with and what amounted then to a debt bondage no longer exists.

The class that has been steadily coming into the country and is by far the most valuable from an economic point of view is the settler. Recruited principally from southern China and from among the Hakka people, they succeed in making a living within a few weeks of their arrival. The suburbs of all our principal towns and stations have been turned into flourishing gardens. In certain districts the Chinese have mixed with the native population, taken up land that the natives do not want and, to some extent, have married native wives. The settlers provide the towns with fruit, vegetables, poultry and pigs and many of them have acquired



North Borneo Railway: Mail and Passenger Train at Jesselton



Coconut Estate: The Property of Mr. Chow Ah Qui



Draining new clearing, near Jesselton

(All Photos by Mann Singh, Jesselton)

quite considerable areas of land which they have planted with rubber or coconuts. They are without exception the most desirable class of people that any country could wish to possess. It is therefore not unnaturally that the government encourage their immigration in every way possible, offer them tempting terms for taking up land and subject them to a very light taxation.

The conditions under which Chinese may come to Borneo to-day are the provision of free passages for themselves and their families and a grant of land up to five acres with purely nominal rent for the first six years. As the North Borneo government is not possessed of great wealth the number of free passages is restricted but every encouragement is given to others who can afford to pay their own expenses for the voyage from China.

The immigrant can take his choice as to how he intends to use the land given to him. He may, as many do, set up as a market gardener, breeding pigs and poultry as well. He may prefer, if his land is suitable, to plant coconuts which, in seven years, will assure him a permanent and handsome return for his outlay, or he may try his land at rice, pine-apples, bananas, ground nuts, sugar, coffee, pepper, gambier or rubber. The last is, like coconuts, a question of waiting for several years but all other forms of cultivation give him a return within a short time and all find a ready market.

He will find himself unharassed by grasping officials, free to work out his salvation in his own way and to follow the customs of his country and religion without interference. Various missions and societies provide schools for the children of the settlers whose sons as often as not forsake the gardens to become clerks in government offices or business firms.

The successful settler often puts his profits into a small shop and progresses by easy stages from being a penniless coolie to swaggering with the best of them as a full-blown Towkay.

We are beginning to find that the Chinese who become wealthy do not, as was the habit in former days, take themselves and their profits back to China. They prefer to invest it in the country and seem perfectly contented to live out their lives in the land of their adoption.

Even without further immigration their numbers are increasing rapidly. Infant mortality is low and there are ample facilities for medical treatment at most of the settlements. We firmly believe that if the conditions under which Chinese can



Hakka Fruit Seller

and do live in Borneo were better known and understood by the southern Chinese we should have to organize a special department to deal with the question of immigration. As it is there seems to be a lot of hesitation on their part before they can make up their minds to abandon their own country. The best means of getting them down that we have found has been to allow established settlers to return to China at our expense and bring down their relations. In this way a steady but limited immigration has been established. The government have more than once tried to organize systematic emigration from China but on each occasion the system has broken down, generally owing to the business being mismanaged in China. Government immigrants arrived burdened with a debt for their expenses from China and for the cost of building their houses. A man who sets out to

make good with such a millstone round his neck is seldom if ever a success. Wisely the government has now decided to pay the expenses themselves and to see the return on their money come from the development that settlers bring about. Done in this

way, with a hand on the brake to check the influx of undesirables and weaklings, we shall in time reap a rich harvest by seeing our population increase and with it our trade and revenue.

There are in North Borneo immense tracks of country which are practically uninhabited. The country being mountainous practical-

ly any form of cultivation up to an altitude of 4,000 to 6,000 feet can be undertaken with success. There is land more than sufficient to plant rice in quantities which would make the country self-supporting as regards its principal food. From the terminus of government railway for instance a road is under construction to connect the plains of Keningau with the coast. On these plains which stretch for over 20 miles there are but a few

scattered villages of Muruts, a native tribe who cultivate nothing beyond the land immediately around their villages. The plains are traversed by several rivers which will make a system of irrigation inexpensive to initiate and covering thousands of acres of good land. A Chinese colony established in this valley would prove a flourishing concern within a very short time. Similar areas equally suitable for rice are to be found throughout the country but the government naturally hope to develop the land beyond the rail-head to provide freights and passengers for their railway which has so far been a burden on the revenues of the country.



In the Rice Fields



Copra

In additions to the railway and road extension from the port of Jesselton towards Keningau, a road 22 miles long has been built and is now in course of being metalled which will throw open other large tracts of land on the west coast. From Sandakan, the capital and principal trading port on the east coast, road construction has been completed for a distance of fifteen miles penetrating forest country which will become first-class agricultural land when the timber has been felled. These few places which have been specially mentioned would absorb quite 20,000 settlers and still leave the greater part of 30,000 square miles to be developed. As the present resources of the country are not sufficient to finance anything approaching 20,000 immigrants the populating of the country by Chinese must for the present remain more or less a dream.

Much, however, can and should be done by judicious propaganda among the people of south China to induce them to emigrate on their own initiative and found new homes in this rich land. With our small population poverty is practically unknown. A small proportion of the Chinese laboring class do become from sickness or disinclination to work a burden upon the state but the proportion is so small as to be almost negligible men of the artisan and laboring classes find good employment at wages which keep them in comfort. The artisan can command as much as \$2 per day and laborers from 40 cents to 80 cents. The cost of living depends, for the Chinese, principally upon the cost of rice which is now about 50 per cent. above pre-war prices and other requirements are by no means costly as taxation is directed more against luxuries than against the necessities of the less wealthy class. The native of the country is entirely self-supporting except for his clothing which he buys from the Chinese traders.

It is to be understood that Borneo is no fever-stricken, pest-haunted tropical swamp but a country capable of maintaining a dense population and of producing much that the outside world can make use of.

The chartered company has successfully carried out its mission of subordinating the indigenous races to civilized rule, it has to a certain extent developed its property but to an extent which is only the beginning of what can and should be done in the future. Its revenues to-day are not sufficient to enable the government to carry out ambitious schemes of development. Its coast is deficient in lights, its harbor backward in facilities for loading steamers and its road system in its infancy. What can be done on the revenues has been done but those who criticise the administration for its backwardness forget that bricks cannot be made without straw. Our greatest want, population, exists in millions in China, we shall do her no harm and ourselves much good if we can successfully induce her access population to try their luck in a new country.

Dutch Activities in China

FOR years past the Hollanders have almost entirely neglected their chances in China and looked passively on whilst Belgians, Britishers, French, Japanese and Germans made a profitable business out of the construction of railways, and supplying the necessary rails, bridges and rolling stock. Dutch activities have been confined to the harbor works at Shanghai and Chefoo, writes the "Gazette de Hollande," but how much more might have been accomplished! It has chiefly been the Belgians who have applied themselves energetically to obtaining command of the Chinese market. Their efforts have considerably benefited the industry of Belgium, which has for years been supplying all kinds of materials to a value of tens of millions of francs per annum. By means of an extremely practical mode of co-operation between Belgian industry and the banks, the Banque Belge pour l'Etranger in China is doing excellent business.

It has now become possible for Dutch business men to participate in one of the large concerns based on the said co-operation. The Dutch syndicate for China has obtained a share in the

construction of the Lung-Hai Railway, which will connect Lanchow, the capital of the province of Kansu, with Haichow, on the China sea. On May 1, 1920, an agreement was signed between the said Dutch syndicate, the Chinese government and the Belgian Compagnie Générale de Chemins de Fer et de Tramways en Chine, according to which Dutch engineers will construct the railway from Hsü-chow-fu to Haichow (about 240 kilometres), as well as the ocean harbor at the latter place. These great harbor works will be constructed by contractors to be appointed by the Dutch syndicate for China, whilst the material for railway construction will preferably be supplied by Dutch industry. To finance the undertaking, the syndicate will place a loan of fl. 50,000,000 in Chinese treasury notes on the market. The payment of interest and the redemption of these treasury notes has been guaranteed by the Chinese government and by a special mortgage on the railway, whilst the engineer-in-chief will have absolute control over the expenditure and receipts of the line. This is, therefore, not a state loan in the ordinary sense of the word but an issue of specially guaranteed treasury notes upon security capable of itself producing the means of paying both interest and redemption.

On this solid basis, Holland has begun to take part in the promising economic development of China, says a writer in the "Nieuwe Rotterdamsche Courant." The harbor plans for Haichow have been studied by the Dutch experts and our railway engineers have begun work, and already reached the Great Chinese canal.

It is, therefore, not a little disappointing that the issue of the first part of the treasury loan was not a success on the Amsterdam market. Doubtless, this was partly due to the rumors of civil war in China last spring. Far from shaking confidence, however, the fact that this war did not in the least injure the prospects of the works ought to be reassuring, inasmuch as it has proved that such concerns, involving foreign interests, are respected, even in times of civil disturbances.

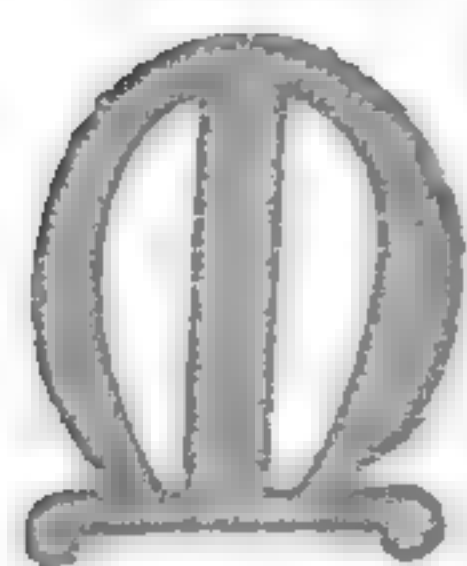
Nothing is better calculated to demonstrate the value of old Chinese culture than the fact that civil war or any other political event which in western countries would bring business life absolutely to a standstill, has no power to ruffle the calm of the Chinese people, who perform their daily tasks unperturbed. If one further reflects that China numbers 400,000,000 inhabitants and that its foreign trade as yet represents only fl. 9 per head (as against fl. 1,090 in Holland), it is clear that there are enormous possibilities for trade, industry and shipping in that country with its industrious, intelligent and peaceable population.

Chinese Cement Factory Proposed

PLANS are under consideration for the construction of a small cement plant in the vicinity of Kaying city, which is about 150 miles inland from Swatow, on a branch of the Han river, says the U.S. Commerce Reports. The necessary materials are reported to be found in abundance in this district, and it is intended to test out the possibilities of this business by establishing a small plant, which, if circumstances justify, will subsequently be enlarged.

Descriptive matter and proposals are desired for the cement-making machinery required for a complete plant. Proposals should be addressed to Ching Wen-san, care of Messrs. Tek Hua Seng, Chaochowfu, via Swatow, China. Communications in English can be understood, but correspondence with Mr. Ching Wen-san must be in Chinese. Transactions of this character should be handled through representatives in China, who presumably would be located in Swatow, Canton, or Hongkong, although possibly Shanghai representatives could reach this district.

Radio in China



R. E. T. LOCKWOOD, writing in the *Radio News*, deals extensively with Radio matters in China. The following is extracted from his article:—

The Chinese government has a few spark stations of moderate power, most of which carry on commercial business. They are efficient stations as far as they go, but at present the government radio facilities are very inadequate. They do not have in operation a single station capable of transmitting regularly over a thousand miles, although many are in contemplation.

The best stations in China are those that the Japanese government has established. There are several powerful stations at strategic points in China. The Japanese are constructing a large station near Peking for the Chinese government at the present time.

The Federal Telegraph Company of America has contracted with the Chinese government for the rection of several high power radio stations, notably one at Shanghai, to be one of the largest in the world. This will be of great value to commercial interests in China because of the irregularity of the cable.

Peking-Tientsin Radiophone

Because of the difficulty of maintaining the regular (or irregular) long distance wire telephone, the China Electric Company, in co-operation with the Chinese government, has put in operation two stations to be used in lieu of the land line between Peking and Tientsin. Speech travels from house telephone in one city, via land wire, then radio, and then land wire again to the house telephone in the other city, a distance of over 70 miles. Both stations are easily heard in Shanghai, a distance of 650 miles. This is the largest service of its kind in the world, and it's in China!

Chinese writing is hieroglyphic and so the Chinese have had to compile a code book of characters corresponding numbers. Thus each character is designated by a number in telegraphic communication. The standard Chinese dictionary contains something like 40,000 characters, but the ordinary number used does not exceed 5,000.

The French have established a system of stations throughout China and Indo-China. They deserve much credit for the way in which they have for years rendered weather forecast service and time signals. The time signal is of the letter type not beating off seconds, and is accurate to within a few seconds. The signals are relayed from the French observatory in Shanghai to the local station FFZ.

Japanese QRM

Much has been said about Japanese interference, intentional and otherwise. The main difficulty seems to be that the transmitters are directly coupled, of course, producing high decrement and a broad wave. The main difficulty with the Japanese themselves seems to be that they have an ingrained liking for repetition, which, with their cumbersome and lengthy alphabet, makes the whole Japanese navy a nuisance to amateur, as well as to professionals, Naval ships of various countries are allowed to use full power in the port Shanghai.

Like most governments the Chinese government intends to be strict with regard to radio regulations. Private radio stations on Chinese territory are frowned at by the authorities and in many instances, they have had to be dismantled, causing the foreign consuls much inconvenience. However, Shanghai is an international settlement, the government being carried on by a municipal council, elected by the people of all nations, exclusive of Chinese. Under these conditions the Chinese government has not attempted to exercise radio jurisdiction as to wave-lengths, power, etc. The amateurs of Shanghai, for the most part, would welcome legislation on the part of the Chinese government, providing the rules were not too strict, for it would give the amateurs their own realm.

The Chinese government seems to be too busy running more important affairs and has not had time to enforce regulations on amateur wireless.

Not Much Amateur Transmitting

As a matter of fact, however, since there are no amateurs to send to outside of Shanghai, there has been very little transmitting on the part of amateurs. At present, the few who have powerful transmitters use pretty much whatever they please, as did the one mentioned in the beginning of this article.

Although the writer is informed that there are at present over 100 amateurs in Shanghai, they have never organized a club, but it is anticipated that such an organization will be formed in the near future. Such a radio club would be an innovation in the way of nationalities represented in that it would include Americans, British, French, Dutch, Portuguese, Chinese and possibly several others. It might be able to do a great deal toward putting amateur radio in China on a firm basis.

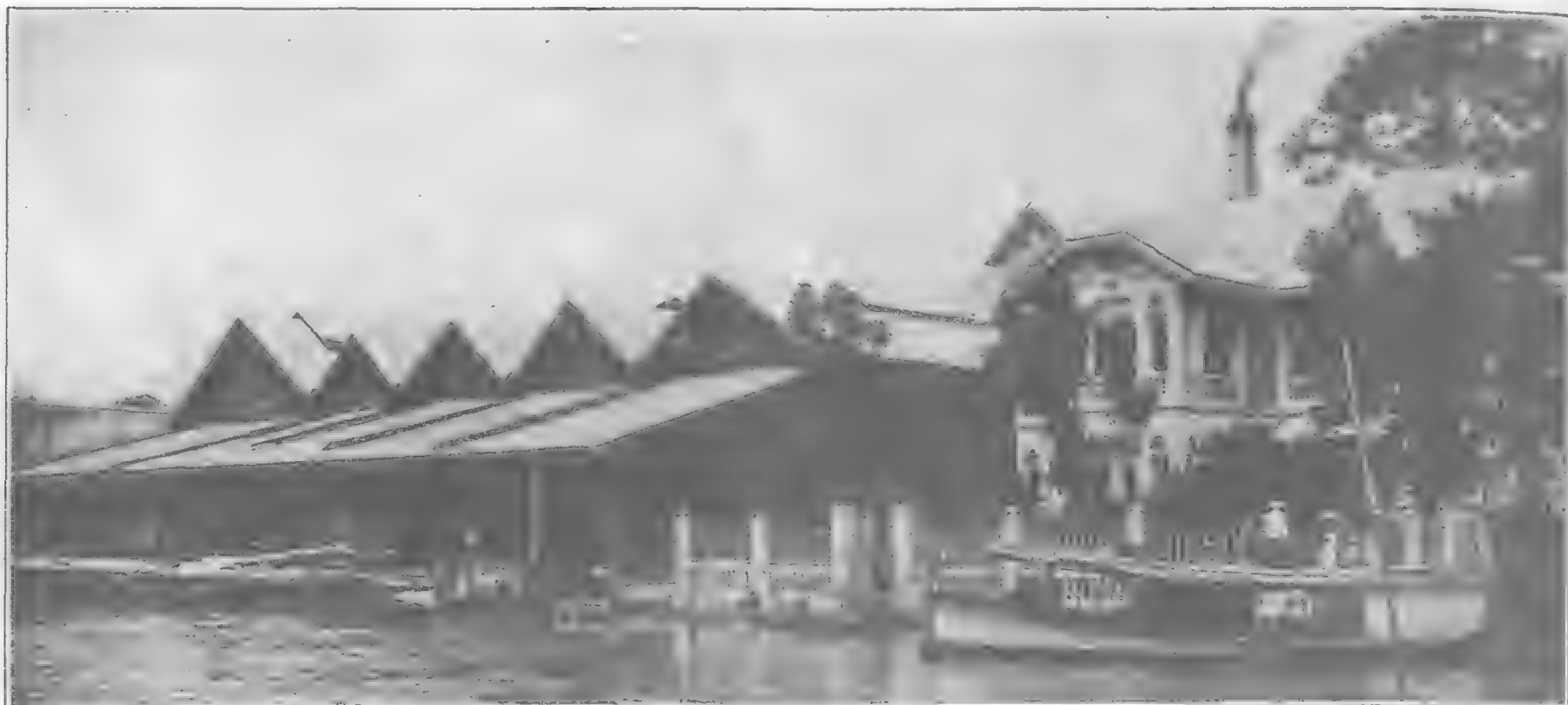
From Coast to Coast

Because of its central location, Shanghai is an admirable place from which to cover the world by radio. It is a convenient thing to remember that London and Paris, Shanghai and Manila, and San Francisco are equi-distant points around the world. European stations come in strong here, both large and small. Pacific coast American stations also come in well. Even atlantic coast stations have been heard in Shanghai. It is a coincidence, and many of you may have heard. Pearl harbor and Nauen sending time signals at the same time, one at noon and the other at midnight. Their wave lengths are such that they both can be heard at one adjustment. The air in Shanghai is practically free from static in winter, but in hot weather it is likely to be very heavy.

A short time ago the writer was astonished to hear perfectly good Peking Chinese language floating around the ether. "The whole world do move!" He was interested to read in a recent number of *Radio News* that Chinese was "just a gurgle." If it is in life a gurgle, over a wireless phone it's a strangling performance.

Nanyang college, at Shanghai, one of the leading Chinese technical schools of the country, has instituted a course in radio engineering. They have been fortunate enough to secure the services of Mr. T. C. Chang, an American-trained radio engineer, who, as head of the department, is rendering great service to radio in China. At present there are about 20 students taking up this line. It is a full-fledged engineering course, not merely a school for operators.

One of the most interesting radio enterprises in China has been the popular educational movement under the direction of Prof. C. H. Robertson of the lecture department of the Y. M. C. A. He purchased, while in America a short time ago, the two complete radio telephone stations which were used in the victory way in New York city during the victory loan drive. These he has cleverly mounted in trunks, so that in a few minutes' time, the two stations can be set up for lecture purposes. On one tour of about 12 cities, 100,000 people heard him speak. To see some old Chinese governor with the phones clamped to his ears, as interested as a kid, is a sight to make one think that China has got to wake up. He has given lectures to the leading generals of the country and even before the president of the republic himself. It would not be surprising if China was one of the first countries in the world to establish a satisfactory commercial network of wireless telephones, because land lines have never been installed. Because of the great distances to be covered and the difficulty of procuring land even to plant telephone poles, the wireless telephone may solve one of the greatest communicational difficulties between China's 1,900 walled cities.



A Typical Bangkok Rice Mill: The Hu Long Heng Chan Rice Mill

Siam's Rice Mills

IN normal years, milled rice forms at least 80 per cent. of all exports from Siam. However, since 1919 the rice market has not been in a normal state, and although the rice shortage of 1919-20 forced the price of rice to an average of Tcs. 16.61 per picul for a total of Tcs. 123,083,000, the output in piculs was 7,409,453 against an average yearly output of 18,000,000. Restriction of export, which was ordered in November, 1919, was not removed until January 1921, and the export of rice for the year ending March 31, 1921, was only 4,660,487 piculs.

The Siamese are essentially an agricultural people, and have devoted 5,959,200 acres, chiefly on the alluvial plains of central Siam, to the cultivation of rice. With few exceptions the paddy is milled in Bangkok, the milling industry being exclusively in the hands of the Chinese. European firms formerly operated rice mills, but were unable to compete successfully with the Chinese. With the seizure of German property in 1917, the last European rice mill went out of existence.

There are 75 steam rice mills in Bangkok, and 4 electric mills. The high value of the tical and the low value of the rupee gave Burmese rice a distinct advantage on the early 1922 market, and 17 Bangkok mills have temporarily closed awaiting a more favorable exchange or an increased demand for rice.

The Chinese millers deal directly with the Hongkong and Singapore markets, but sell through European firms for the Java and European markets. Occasionally markets in the West Indies and Japan are generally supplied by non-Chinese firms.

PADDY FROM VARIOUS PLACES LANDED AT BANGKOK RICE MILLS INCLUDING RICE MILLS AT PAKLAT AND SAMSEN

(1 kwien=16 piculs)

Paddy landed at Mills

1922 Month	By Boats Kwiens	By Rails		Total Kwiens
		N. Line Kwiens	S. Line Kwiens	
January ..	7,418.92	9,340.95	60.00	83,590.87
February ..	78,569.42	13,200.08	105.30	91,874.80
March ..	77,752.57	10,250.92	1,131.47	89,134.96
April ..	72,269.98	12,761.97	1,523.23	86,555.18
May ..	45,195.28	8,185.77	1,633.60	55,014.65
June ..	47,356.47	10,025.55	1,634.50	59,016.52
July ..	55,677.20	5,822.77	1,352.60	62,852.57

(Figures supplied by the department of Statistics, Royal Siamese government, Bangkok).

Rice Mills Situated at Bangkok

Mill and Location:

Hoa Heng Seng W. Bank, Menam (Paklat)
 Kim Thye Seng, W. Bank, Menam (Paklat)
 Kwang Huat Lee, W. Bank, Menam (Paklat)
 Eiah Lee, W. Bank (Ratboonak)
 Hong Long Huat, W. Bank (Bangpakok)
 Nam Heng Lee, W. Bank (Bangpakok)
 Chin Seng, W. Bank (Bangpakok)
 Kwang Guan Lee, W. Bank (Bangpakok)
 Kwang Mong Seng, W. Bank (Bangpakok)
 Lim Heng Chang, W. Bank (Bangpakok)
 Siang Heng Long, W. Bank (Klong Daokanong)
 Chai Soon Kee, W. Bank (Klong Daokanong). Closed
 Ngee Seng Huat, W. Bank (Klong Daokanong)
 Kwang Hap Seng, W. Bank (Klong Daokanong)
 Teck Lee, W. Bank (Klong Daokanong)
 Kwang Hong Chiang, W. Bank (Klong Daokanong)
 Long Heng Lee, W. Bank (Klong Daokanong)
 Siang Kee Chan, W. Bank (Klong Daokanong)
 Guan Hoa Seng and Guan Hong Seng, W. Bank (Klong Daokanong). Closed
 Liang Huat Lee, W. Bank (Klong Daokanong)
 Hoa Heng Chieng, W. Bank (Klong Daokanong). Closed
 Li Tit Guan, W. Bank (Klong Daokanong)
 Kwang Joo Seng, W. Bank (Klong Daokanong). Closed
 Kwang Long Seng, W. Bank (Klong Daokanong)
 Guan Cheng Seng, W. Bank (Klong Daokanong)
 Fook Lee (Samrei), W. Bank (Klong Daokanong)
 Poh Thye Heng, W. Bank (Klong Bang Luang)
 Yong Hing Chan, W. Bank (Klong Bang Luang)
 Guan Hong Thye, W. Bank (Klong Bang Luang)
 Guan Thye, W. Bank (Klong Bang Luang)
 Siang Heng Chang, W. Bank (Klong Bang Luang). Closed
 Kwang Hoa Lee, W. Bank (Klong Bang Luang). Closed
 Nam Seng Chieng, W. Bank (Klong Bang Luang)
 Poh Thye Seng, W. Bank (Klong Bang Luang)
 Long Heng Chan, W. Bank (Klong Bang Luang)
 Yong Thye Hah, W. Bank (Klong Bang Luang)



Long Heng Chan Rice Mill, Engine Room



Fuel for the Boiler Plant of the Siam Electricity Works in Bangkok consists of Rice Paddy Husks, brought from the Mills by Boats to the Power House

Yong Hong, W. Bank (Klong Bang Luang)
 Hoa Heng Chan, W. Bank (Klong Bang Luang)
 Thye Heng Lee, W. Bank (Klong Bangkok Noi)
 Hoa Heng Lee, W. Bank (Bang Bua Thong)
 Liang Huat Lee, East Bank Menam (Klong Prakanong)
 Meng Heng Seng, East Bank Menam (Klong Prakanong)
 Siang Hong Long, East Bank Menam (Klong Prakanong)
 Kwang Long Chieng, East Bank Menam (Klong Prakanong)
 Khean Heng Lee, East Bank Menam (Klong Prakanong)
 Kwang Heng Seng, East Bank, Menam (Klong Prakanong)
 Nam Long, East Bank Menam (Klong Prakanong)
 Lim Heng Chan, East Bank Menam (Klong Prakanong)
 Guan Lee Chan, East Bank Menam (Klong Prakanong)
 Meng Teck Seng, East Bank Menam (Klong Prakanong). Closed
 Meng Guang Seng, East Bank Menam (Klong Prakanong)
 Kwang Hong Thye, East Bank Menam (Klong Prakanong).
 Closed

Khoon Chom, E. Bank (Klong Poh Yome)
 Long Heng Seng, E. Bank (Klong Poh Yome)
 Fook Wah Sen Kee, E. Bank (Bangrak)
 Soon Seng Heng (Bangrak), Electric Mill
 Guan Heng Lee (Bangrak), Electric Mill
 Buan Lee Huat, E. Bank (Klong Kut Mai), Electric Mill
 Hoo Hong, E. Bank (Klong Kut Mai), Electric Mill
 Kiam Lee Heng, E. Bank (Klong Kut Mai), Electric Mill
 Heng Hong, E. Bank (Klong Kut Mai), Electric Mill
 Lo Jin Hong, E. Bank (Klong Kut Mai), Electric Mill. Closed
 Kim Seng Guan, E. Bank (Klong Kut Mai), Electric Mill. Closed
 Seng Nam Heng, E. Bank (Klong Kut Mai), Electric Mill
 Hoa Hong, E. Bank (Klong Kut Mai)
 Eam Mong Chan, E. Bank (Klong Kut Mai). Closed
 Mean Heng Chan, E. Bank (Klong Kut Mai)
 Soon Hoa Seng, E. Bank (Klong Hoa Lampong). Closed
 Sang Hak Heng, E. Bank (Klong Hoa Lampong)
 Seng Heng Lee, E. Bank (Klong Hoa Lampong). Closed
 Jin Hoa, E. Bank (Klong Hoa Lampong), Electric Mill

Kim Hoa Long, E. Bank (Samsen). Closed
 Hong Choon Huat, E. Bank (Samsen). Closed
 Sieng Hong Long, E. Bank (Samsen)
 Khean Lee Chan, E. Bank (Samsen)
 Joo Huat Seng, E. Bank (Samsen). Closed
 Guan Tit Lee, E. Bank (Samsen)
 Kim Guan Seng, E. Bank (Bangpo)
Siam Mills Elsewhere than in Bangkok
 Kim Hoa Chua, Patriew
 Kim Hoa Seng, Patriew
 Kim Seng Lee, Korat
 Ching Ying Soon, Pak Penang, Sritamarat Province
 Who Hong, Pak Penang, Sritamarat Province
 Kuang Nam Heng, Pak Penang, Sritamarat Province
 Ea Lee, Pak Penang, Sritamarat Province
 Ho Soon Hin, Pak Penang, Sritamarat Province

Chinese Engineering Agency Formed

FOR the first time in the history of China, a group of foreign-educated Chinese have established a "General Engineering and Consulting agency" in Peking. The principal objects of the agency are to facilitate the Chinese and foreigners secure exact, concise and correct information on the various technical subjects in this country in the shortest possible time and at the least expense; to investigate and offer advice on engineering undertaking to be started or already in operation with reference to sources of raw materials, transportation facilities, labor costs, etc.; to recommend technical men to suitable positions; to furnish proposals, plans, specifications, drawings, agreements and estimates on new engineering projects; to render correct and concise technical translation from Chinese subjects to English or French or vice versa and to supply confidential trade reports at intervals to firms or individuals, who may thus be kept in intimate touch with the pulse of the demand of the day. Similar service will be rendered to Chinese clients. Mr. Chung, who is in charge of the agency, says that his office sells service only and does not propose to act as agent or to sell any goods for any manufacturer, though consulting engineers, they may recommend to prospective buyers certain products suitable for the Chinese markets.



German Locomotives used on the Java State Railways. All the engines in Java are of German or Dutch manufacture with the exception of a dozen locomotives from the American Locomotive Company used on the mountain lines between Krawan and Padalarang

N.E.I. State Railways and Tramways

Report for year ending 31st December, 1921

SUBMITTED to the members of the colonial council (volksraad) and the Dutch parliament as a basis for the budget of 1923 by the board of managers of the state railways.

1st Part. General Data

1. RAILROADS AND TRAMWAYS

A. OPEN MILEAGE

Number of *kilometres* being worked at the end of 1920: in Java gauge 1,007 metres, 2,510: of which 64 kilometres are double track; 3.6 km. triple track; 5.3 km. quadruple, and the remainder, single track.

Gauge 0.600 metres, single track, 120; opened for traffic in 1921, single track gauge 1.067 m., 127; total number of kilometres at the end of 1921, gauge 1.067 metres, 2,637; gauge 0.700 m., 120.

In Sumatra (gauge 1.067 metres) the number of kilometres at the end of 1920 was 488; gauge 0.750 m., 511; opened for traffic in 1921, gauge 1.067 metres, 44: total kilometres at the end of 1921: gauge 1.067 metres, 532; gauge 750 m., 511.

Total number of kilometres in Netherlands India, worked by the state:

1.067 metres gauge, 3,169; 0.750 m. gauge, 511; 0.600 m. gauge, 120: total, 3,800 (2,125 miles).

B. WORKING RESULTS (in florins)

	1919	1920	1921
Total capital expenditure to lines being worked, inclusive rolling stock and further equipment	343,201,164	369,489,938	411,446,853
Total earnings	56,543,471	68,875,918	78,557,184
Gross working expenditure inclusive of renewals, depreciation, relaying and strengthening	39,001,162	61,149,229	68,758,482
NET PROFITS	17,542,309	7,699,689	9,798,702
Revenue by passengers	22,435,503	29,565,128	33,315,287
„ „ goods	27,655,148	31,058,448	36,002,124
Ratio of expenditure to earnings	69%	88.7%	87.5%

* 2. ROAD MOTOR SERVICES

			Kilometres
In the province Palembang (Sumatra) .. .. .	..	..	763
„ Benkoelen (Sumatra) .. .. .	..	..	567
„ West coast of Sumatra and Tapanoelie (Sumatra) .. .. .	..	..	930
„ Cheribon (Java) .. .. .	..	..	101
„ Preanger Regentschappen (Java) .. .. .	..	..	88

B. WORKING RESULTS (in florins)

	1919	1920	1921
Balance of capital account at 31st December	1,155,915	1,558,213	1,478,257
Total earnings	1,558,797	2,076,739	1,848,831
Gross working expenditure	1,265,688	2,002,174	2,193,898
Net profits	293,109	74,565	345,067 (loss)
Revenue by passengers	940,623	1,262,382	1,134,310
„ „ goods	572,211	754,698	680,451

Compared with 1919 there was a considerable increase of working costs in 1920, mainly due to necessary cost of living allowances to the whole staff and higher rates of pay to laborers. In 1921 the increase was due to advances in expenditure on the heads maintenance of way and works, inclusive of strengthening of bridges, Fl. 780,000; running expenses owing to increased consumption of fuel and oil, Fl. 3,400,000; traffic expenses owing to increased traffic and the employment of additional staff consequent upon the new regulation of periods of duty (service, labor and resting time), Fl. 1,800,000.

Consequent upon these important increases of the working expenses a committee was appointed to consider and report upon the possibility of decreasing the working expenditure. The investigation had no immediate important result. A slower introduction of the new regulation on service, labor and resting time, reorganization of the stores department and of the management of the workshops were some of the measures proposed by the committee.

* The detailed report on the Road Motor Service was published in the Motor Section of THE FAR EASTERN REVIEW, September, 1922.

Besides it was not deemed advisable to advance rates and fares, in view of the unfavorable conditions abroad of which the influence is felt by trade and agriculture in Netherlands India.

It is impossible to predict how long the universal uneasiness in trade and agriculture will last and it is therefore very necessary to follow an utmost prudent financial policy.



Freight Yard of the Java State Railways at Bandoeng

(Kurkdjian, Sourabaya)

Accordingly it has been investigated how far in the near future the increase of the capital expenditure can be limited without prejudicing the earnings. This was found possible by postponing the construction of some works and delaying a part of the extension program. Consequently, the total amount of the working scheme for 1921 could be brought 3 millions of florins beneath the authorized budget figure and for 1922, 17 millions less.

2nd Part

RAILROADS AND TRAMWAYS

PART 1. IN JAVA

Stores.—Replenishing of the stock has been temporarily stopped and orders in Europe and in the colony were cancelled in so far as it was possible. Only indispensable purchases were made to assure a regular service.

Double Tracks.—April 1st the Krawang-Tjikampek line was double tracked a distance of 21 kilometres, was opened to traffic and the section Meester Cornelis to Bekasi, a distance of 15 kilometres, is nearly completed. As soon as the new bridges over the Tji (river) Taroem and Bekasi river are received and erected, the double tracking of sections Kedoenggedeh to Krawang (6 kilometres) and Bekasi to Tamboen (7 kilometres) will be opened for traffic. In East Java the doubling of the Wonokromo-Krian line (21 kilometres) is being continued while work on doubling the section Krian to Modjokerto has been stopped. The survey for doubling the Kroja-Idjoe-Wonosari line (53 kilometres) is in progress and the survey for doubling the sections

Manggarai to Buitenzorg (45 kilometres) and Modjokerto to Kertosone (40 kilometres) was started. Plans and estimates for doubling the section Padalarang to Bandoeng (12 kilometres) have been prepared.

Relaying.—The sections Bandjar to Tjipari (28 kilometres) and Bangil to Pasoeroean (16 kilometres) have been relaid with rails of 33.4 kilograms per metre (in England known as 80-lb. rails). A total of 1,200 kilometres has already been relaid.

Rolling Stock.—During the year, 81 standard gauge locomotives were placed in service with 63 still on order. The number of engines in service on the standard gauge lines in Java on 31st December, 1921, was 578. 78 new coaches for standard gauge and 8 narrow (0.600 metre) gauge coaches were placed in service during the year, all of which were built in the administration's workshops. The wagon stock at 31st December, 1921, was 13,561 standard gauge; 1,873 new goods vehicles, all built in the administration's workshops, were placed in service.

Steamship—Workshops.—To facilitate and accelerate more important repairs, situated at a great distance from the central workshops, small workshops have been erected.

WORKING RESULTS (of Standard Gauge Railroads and Tramways)

	1921	1920	Increase
	florins	florins	florins
Gross earnings	68,517,244	59,809,798	8,707,448
Gross expenditure	57,795,649	50,773,621	7,022,026

Earnings in excess of Expenditure 10,721,595 9,036,177 1,685,418

Compared with 1920 there was an increase in earnings of 15 per cent. and an increase in expenditure of 14 per cent.



Locomotive Shed at Manggarai, near Batavia

WORKSHOPS OF THE N.E.I. RAILWAYS



Madioen Shops



Manioen Shops

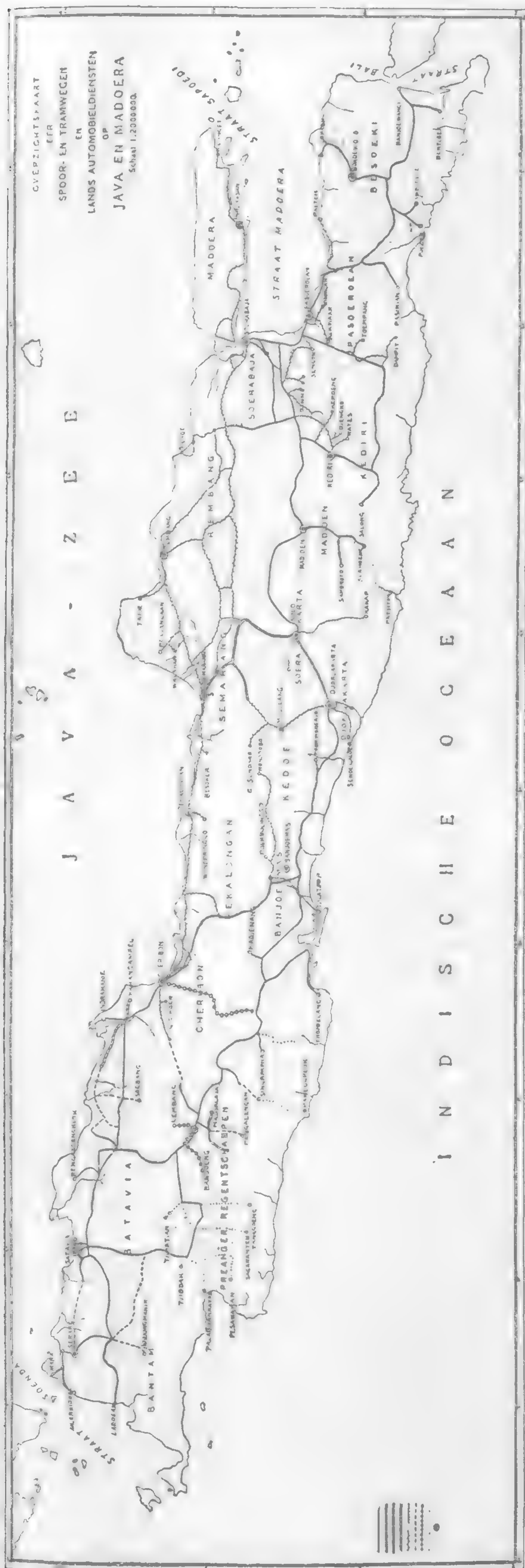


Forge Shop at the Madioen Shops



Wheel "hospital" at the Bandoeng Shops

(Photos by Kurdjian, Sourabaja)



Earnings.—The earnings under the several main heads and the percentage under each head to total earnings were as follows :

	1921	Per cent. of Total Earnings	1920	Per cent. of Total Earnings
	florins		florins	
Passengers	29,843,712	43.5	26,281,145	44
Luggage	679,962	1	586,230	1
Parcels	2,734,372	4	2,124,816	3.4
Goods	30,705,580	45	26,413,280	44
Live stock, corpses and carriages	393,329	0.5	375,378	0.6
Other traffic receipts	4,160,289	6	4,028,949	7
Totals	68,517,244	100	59,809,798	100

The total earnings per day kilometre, compared with 1920 were: 1921, fl. 72.62; 1920, fl. 65.16. The increase of passenger earnings was 13.55 per cent. and increase of goods earnings was 16.25 per cent.

Expenditure.—The working expenditure inclusive of double tracking, relaying and strengthening but exclusive of renewals and depreciation, was :

1921, fl. 57,795,649 or fl. 61.25 per day kilometre.

1920, fl. 50,773,621 or fl. 55.31 per day kilometre.

showing an excess of fl. 7,022,028 or 13.8 per cent.

The ratio of expenditure to earnings compared with the previous year was : 1921, 84 per cent. ; 1920, 85 per cent. There were increases under all heads, as follows :

	1920	1921	Increase	
	florins	florins	Total florins	Per cent.
General charges ..	5,091,409	6,129,796	1,038,387	20.39
Maintenance of Way and Works ..	6,220,370	6,999,394	779,024	12.53
Maintenance of rol- lingstock and run- ning expenses ..	25,694,832	29,097,381	3,402,549	13.24
Traffic expenses ..	13,767,010	15,569,078	1,802,068	13.10

MINOR OR SIMPLE LINES*

Java.—The following new standard gauge tramlines were opened during the year: Bandoeng-Soreang and connection Karees-Kiaratjondong, 25.83 kilometres; Rantjaek-Tandjongsari, 11.23; Kalipeotjang-Tjidjoelang, 38.807; Gempolkerep-Plosso, 19.549; Rogodjampi-Srono, 12.390.

Sumatra.—Blambangan-Kotaboemi, 19,796 kilometres; Ga-roentang-Telokbetong, 3,935; Pajacombo-Limbanang, 20,221.

At the end of the year the following simple lines were open for traffic :—

JAVA

1. State tramways in the provinces of Sourabaia and Madioen: gauge, 1,067 millimetres: total length, 173 km.; (a) Krian-Plosso, 46 km.; (b) Babat-Djombang, 71 km.; (c) Madioen-Ponorogo-Soemoroto with branch line Ponorogo-Baloeng, 56 km.

2. State tramways in the district of Krawang: (1) Gauge, 1,067 mm., total length, 19 km.; Djatibarang-Indramajoe. (2) Gauge, 600 mm.: total length, 80 km.; (a) Tjikampek-Tjilamaja, 28 km.; (b) Tjikampek-Wadas, 16 km.; (c) Krawang-Rangasdengklok, 21 km.; (d) Lamarin-Wadas, 15 km.

3. State tramway Rambipoedji-Poeger with branch line Baloeng-Amboeloe: Gauge, 600 mm., total length, 41 km.

*In Netherlands India the tramways take up a part of the conveyance of passengers and goods; they are considered as 3rd class railways and have another character than the town or vicinal tramways abroad. A special division of the railway administration is charged with the management of tramways, the second class railway in Sumatra and the road-motor services. As the working of all these lines, compared with the principal railways, is simple, that division is called "Division of Simple Lines."

4. State tramways near Bandoeng : Gauge, 1.067 mm. ; total length, 38 km. ; (a) Rantjaek-Tandjongsari, 12 km. ; (b) Bandoeng-Soreang with connection Karees-Kiaratjondong, 26 km.

5. State tramways in the east part of the province of the Preanger Regencies : Gauge, 1.067 mm. ; total length, 101 km. ; (a) Tasikmalaja-Singaparna, 17 km. ; (b) Bandar-Tjidjoelang, 84 km.

6. State tramway Rogodjampi-Srono : Gauge, 1.067 mm. ; total length, 12 km.

SUMATRA

1. State tramway in Atjeh : Gauge, 750 mm. ; total length, 511 km.

2. State tramways in South Sumatra : Gauge, 1.067 mm. ; total length, 267 km. ; (a) Palembang Line, Kertapati (Palembang)-Praboemoelih-Moearaenim-Tandjong, 165 km. ; (b) Lampong Line, Pandjang-Tandjongkarang-Laboeanratoe-Hadjipemanggilan-Blambangan-Kottaboemi with connection Telokbetong-Garoeatang, 102 km.

3. State railway at the west coast of Sumatra : Gauge, 1.067 mm. ; total length, 265 km., of which 50 km. is rack railway and 215 adhesive track.

WORKING RESULTS

The results of the standard (1.067 millimetres) gauge tramways in Java are included in those of the mainline.

I. STATE TRAMWAYS IN THE DISTRICT OF KRAWANG (Gauge 600 millimetres)

	1921	1920	Increase
	florins	florins	florins
Gross earnings	392,963	361,729	31,234
„ expenditure	341,960	303,184	38,776

		Decrease
Earnings in excess of Expenditure	51,003	58,545
		7,542

Compared with 1920 there was an increase in earnings of 8.6 per cent. and an increase in expenditure of 12.7 per cent.

Per day kilometre the earnings and expenditure were :

	1921	1920
	forins	florins
Gross earnings	13.45	12.36
„ expenditure	11.71	10.35

II. STATE TRAMWAY RAMBIPOEDJI-POEGER WITH BRANCH LINE BALONG-AMBOELOE (Gauge 600 millimetres)

	1921	1920	Increase
	florins	florins	florins
Gross earnings	274,763	253,439	21,424
„ expenditure	211,690	175,850	35,840

		Decrease
Earnings in excess of expenditure	63,073	77,589
		14,516

Compared with 1920 there was an increase in earnings of 8.4 per cent. and an increase in expenditure of 20.4 per cent.

Per day kilometre the earnings and expenditure were :

	1921	1920
	florins	florins
Gross earnings	18.36	16.88
„ expenditure	14.15	11.71

III. STATE RAILWAY AT SUMATRA'S WEST COAST

	1921	1920	Increase
	florins	florins	florins
Gross earnings	5,460,203	5,205,348	254,855
„ expenditure	4,197,667	3,714,016	483,651

		Decrease
Earnings in excess of Expenditure	1,262,536	1,491,332
		228,796

Compared with 1920 there was an increase in earnings of 4.8 per cent. and an increase in expenditure of 13 per cent.

Per day kilometre the earnings and expenditure were :

	1921	1920
	florins	florins
Gross earnings	58.44	58.05
„ expenditure	44.73	41.42

The ratio of expenditure to earnings compared with the previous year was in : 1921, 76.88 per cent. ; 1920, 71.36 per cent.

Earnings.—The earnings under several mainheads compared with 1920 were as follows :

	1921	1920	Total	Increase
	florins	florins	florins	Per cent.
Passengers and luggage	1,378,684	1,292,777	85,907	6.64
Goods	3,142,299	3,121,317	20,982	0.77
Other traffic receipts.	939,220	791,254	147,966	18.70

Expenditure.—Comparative figures of expenditure under the following heads are :—

	1921	1920	Total	Increase
	florins	florins	florins	Per cent.
General charges ..	1,076,738	778,375	+298,363	38.33
Maintenance of way and works ..	745,529	575,100	+170,429	29.63
Maintenance of rolling stock and running expenses ..	1,642,088	1,613,457	+ 28,631	1.78
Traffic expenses ..	630,917	669,358	— 38,441	—
Electric power station	102,395	77,726	+ 24,669	31.75

IV. STATE TRAMWAY IN ATJEH

	1921	1920	Increase
	florins	florins	florins
Gross earnings	1,786,299	1,746,069	40,230
„ expenditure	1,981,709	1,862,065	119,644

Expenditure in excess of Earnings	195,410	115,996	79,414
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Compared with 1920 there was an increase in earnings of 2.3 per cent. and an increase in expenditure of 6.24 per cent.

Per day kilometre the earnings and expenditure were :

	1921	1920
	florins	florins
Gross earnings	9.57	9.33
„ expenditure	10.62	9.96

The ratio of expenditure to earnings compared with the previous year was : in 1921, 111 per cent. ; in 1920, 106 per cent.

Earnings.—The earnings under several mainheads, compared with 1920, were as follows :

	1921	1920	Total	Increase
	florins	florins	florins	Per cent.
Passengers and luggage	1,057,232	1,053,711	3,521	0.33
Goods	557,541	524,982	32,559	6.20
Other traffic receipts.	171,526	167,376	4,150	2.50

Expenditure.—Comparative figures of expenditure under the following heads are :—

	1921	1920	Total	Increase
	florins	florins	florins	Per cent.
General charges ..	359,127	347,209	11,918	3.4
Maintenance of way and works ..	433,071	403,155	29,916	7.4
Maintenance of rolling stock and running expenses ..	881,408	841,064	40,344	4.8
Traffic expenses ..	308,103	270,636	37,467	13.8

VI. STATE TRAMWAYS IN SOUTH SUMATRA

	1921 florins	1920 florins	Increase florins
Gross earnings	2,125,712	1,499,536	626,176
„ expenditure	1,559,403	1,316,050	243,353
Earnings in excess of Expenditure	566,309	183,486	382,823

Compared with 1920 there was an increase in earnings of 42 per cent. and an increase in expenditure of 18 per cent.

Per day kilometre the earnings and expenditure were :

	1921 florins	1920 florins
Gross earnings	21.97	16.93
„ expenditure	16.12	14.86

The ratio of expenditure to earnings, compared with the previous year was : in 1921, 73.31 per cent. ; in 1920, 87.77 per cent.

Earnings.—The earnings under several main heads, compared with 1920 were as follows :

	1921 florins	1920 florins	Increase Total florins	Per cent.
Passengers and Lug- gage	588,547	542,787	45,760	8.43
Goods	1,409,156	833,182	575,974	69.13
Other traffic receipts	128,009	123,567	4,442	3.6

The advance in the revenue of the Palembang line, compared with a previous year, was : in 1921, fl. 578,138 ; 1920, 256,875.

The greater advance is to be contributed to the increase of coal traffic, consequent upon a larger output of the state collieries at Bukit Assam. A comparison of recent years figures of the revenue on coal traffic is as follows : 1919, fl. 346,565 ; 1920, fl. 426,175 ; 1921, fl. 820,230.

The advance in the revenue of the Lampong line compared with a previous year was : in 1921, fl. 73,148 ; 1920, fl. 33,820.

The trade depression consequent upon the fall in price of pepper, rubber, coffee, etc., has disturbed the gradual development of the traffic of this line.

Expenditure.—Comparative figures of expenditure of both lines under the following heads are :—

	1921 florins	1920 florins	Increase Total florins	Per cent.
General charges ..	260,713	282,569	— 21,856	—
Maintenance of way and works ..	373,186	262,857	+109,329	41.58
Maintenance of rol- ling stock and run- ning expenses ..	728,866	574,521	+154,345	26.90
Traffic expenses ..	145,894	124,801	+ 21,093	16.90
Ferry service :				
Palembang - Kerta- pati and Road motor service Telokbeton-Tand- jongkarang ..	50,744	71,301	— 20,557	—

3rd. Extension and New Works

§ 1. RECONNAISSANCE AND SURVEY

JAVA

The surveys of the following lines have been completed :—
(a) Garoet-Tjikandjang, distance 32 km. ; (b) Bandjaran-Penga-

lengan, 21 km. ; (c) Kopo-Tjiwidei', 12 km. ; commencement was made with the preparation of the construction : (d) Tandjongsari-Soemedang (lengthening of the tramway Rantjaek-Tandjongsari), distance for adhesive railway : 21 km. and for rack railway : 17½ km. An examination of a route for electric tractive power has been commenced. (e) An aerial ropeway from the Kawapoetih volcano to Tjiwidei, distance, 8 km.

Because of financial reasons, the examination of routes connecting the west part of the provinces of the Preanger Regencies and Bantam and the terminals Tangerang to Serang has been stopped. A survey of a line Soebang-Pegadenbaroe-Pamanoekan, 37, km., was commenced. The municipality of Bandoeng has commenced a study of the tramway problem on the plain of Bandoeng. The working out of a reconnaissance of an extension of the tramway system on the plain of Djember and an investigation into operation of road motor services in the province of Banjoemas is in progress.

SUMATRA, BORNEO, CELEBES, BALI AND LOMBOK

In progress are : (a) the survey of the line Lahat to Djambi in South Sumatra ; (b) examination of the traffic problem in the province of Benkoelen ; (c) a new examination of the tramway problem in the isles of Lombok and Bali ; (d) the survey of the line Batangtoroe to Padangsidempoean, distance 28 kilometers. The reconnaissance in the gorge of the Kwantan river has been stopped. The report of the reconnaissance of the railway connection in central Sumatra and the connection between the lines of the west coast with the South Sumatra system and the survey of a line, Sibolga to Batangtoroe, distance 49 kilometres in the province of Tapanoeli is completed. A reconnaissance in the province South and East districts of Borneo, for examination into the possibility of transport of iron ore from the Soengeidoewa district to the coast is being made.

§ 2. CONSTRUCTION

All the following tramways have standard gauge (1,067 millimetres).

1. *Bandjar-Kalipoetjang-Tjidjoelang Tramway* (part of the East Preanger tramway system).—This tramway starts from Bandjar station on the mainline Bandoeng-Djokja and runs in a south easterly direction to Kalipoetjang on the Indian Ocean, a distance of 44 kilometres ; and from Kalipoetjang in a westerly direction to Tjidjoelang, a distance of 39 kilometers. This tramway was opened for traffic as far as Kalipoetjang on 15th December, 1916 and the whole line on 1st June, 1921. The total expenditure amounted to fl. 9,619,162.

2. *Tramway Rogodjampi-Bentjoelock.*—This tramway, which starts from Rogodjampi station on the mainline Kalisat-Banjocwangi, runs in southerly direction to Bentjoelock, a distance of 42 kilometres, and was opened for traffic as far as Srono, 13 kilometres from Rogodjampi, on 26th October, 1921. The other portion of the line has not yet been opened for traffic but handed to the open line only. The total expenditure amounts to fl. 895,387.

3. *Tramways near Bandoeng.*—(a) Rantjaek-Tandjongsari-Soemedang. This tramway starts from Rantjaek station on the mainline Bandoeng-Djokja at a distance of 18 kilometres from Bandoeng and runs in a north-easterly direction to Tandjongsari, distance 12 kilometres. This section was opened for traffic on 13th February, 1921. The preliminary work of the construction of the line Tandjongsari-to Soemedang, distance 30 kilometres, has been stopped, because of the decision of the board of directors of the state railways to examine a less expensive route for electric tractive power. Total expenditure amounts to fl. 1,214,213.

(b) *Bandoeng (Karees station)—Bandjaran-Soreang, with connection Kiaratjondong-Karees.*—This tramway starts from Ban-

doeng and runs in a southerly direction, and was opened for traffic on 13th February, 1921. Distance 26 kilometres. The total expenditure amounts to fl. 579,246.

(c) *Soreang-Tjwidei*.—This line will be 12 kilometres long. The preliminary work has been completed. The acquisition of land can commence. The total expenditure amounts to fl. 94,135.

(d) *Tjiteureup-Madjalaja*.—This line was nearly completed on the end of the year. Total mileage is 17 kilometres. The total expenditure amounts to fl. 698,958.

4. *Tramway Toeloengagoeng-Trenggalek-Toegoe*.—This line starts from Toeloengagoeng station on the mainline Kertosono-Blitar and runs in a westerly direction to Tjampoerdarat, a distance of 14 kilometres. This section has been opened for traffic on 15th July, 1921. The construction of the section beyond Tjampoerdarat a distance of 35 kilometres is in progress. The total expenditure amounts to fl. 1,849,783.

5. *Tramways in South Sumatra*.—(a) *Lampung Palembang connection*.—From the Lampung line, which starts from Oosthaveh (Pandjang), already 102 kilometres, have been opened for traffic, viz. :

Pandjang-Tandjongkarang, 12 km., on 3rd August, 1914.
Tandjongkarang-Laboeanratoe, 5 km., on 1st March, 1915.
Laboeanratoe-Tegineng, 22 km., on 1st November, 1915.
Tegineng-Hadjipemanggilan, 24 km., on 1st February, 1917.
Hadjipemanggilan-Blambangan, 14 km., on 1st February, 1918.
Blambangan-Kottaboemi, 20 km., on 2nd January, 1921.
Branch line Telokbetong-Garoentang, 4 km., on 27th May, 1921.

Work on the second section is in progress. After the bridge over the Wai Rarem river near Kottaboemi had been completed, the laying of permanent way could be continued beyond Kottaboemi.

The following section of the Palembang line has been opened for traffic : Kertapati (Palembang)-Praboemoelih, 78 kilometres on 1st November, 1915. The work on the section Praboemoelih-Martapoera (128 kilometres) is in progress. Earthwork is completed to the 84th kilometre.

(b) *Praboemoelih-Moearaenim*.—This tramway starts from Praboemoelih on the mainline Palembang-Oosthaven and runs in westerly direction to Moearaenim, distance 74 kilometres. The section Praboemoelih to Goenoeng Megang (4.5 kilometres) has been opened for traffic on 1st December, 1916 and the section Goenoeng Megang-Moearaenim (29 kilometres) on 2nd April, 1917. The total expenditure on the lines (a) and (b) amounts to fl. 36,330,928 on 31st December, 1921.

(c) *Moearaenim-Tandjong*.—This tramway, 13 kilometres long, was opened for traffic on 1st September, 1919. Its principal object is to carry off the output of the state collieries at Bukitassam. The total expenditure on the construction amounts to fl. 852,817.

(d) *Moearaenim Lahat*.—The work is being executed by a contractor. The distance between terminals is 38 kilometres. The total expenditure amounts to fl. 1,683,783 on the end of 1921.

6. *Railroads and Tramways in West Sumatra*.—(a) *in the Province of Sumatra's West Coast*.—(1) *The Tramway Pajacombo to Limbanang*, distance 20 kilometres, starts at the terminus Pajacombo of the railway Emmahaven-Padang-Fort de Kock-Pajacombo and was opened for traffic on 19th June, 1921. The total expenditure amounts to fl. 650,587.

(2) The work on the line Moeara kalaban to Moearo, distance 26 kilometres, is in progress. The completion is urgent in view of the timber supply to the Sawaloento collieries. The expenditure till 31st December, 1921, amounts to fl. 1,077,381.

(b) *In the Province of Tapanoeli*.—The construction has been stopped, because of the reduced construction capital expenditure and the building of other lines being more urgent.

7. *Tramways in Celebes*.—(a) *Makassar-Takalar*.—This tramway starts from Makassar, the capital of the government of Celebes, and runs in southerly direction to Takalar, distance 45 kilometres. The construction is nearly completed.

(b) *Makassar-Maros-Tanete*.—The distance from Makassar to Maros is 29 kilometres and from Maros to Tanete it is 57 kilometres.

The survey and estimates have been completed. The acquisition of land is advanced to Maros. In view of reduced construction capital the construction is not yet commenced. The expenditure amounts to fl. 2,833 410.

§ 3. IMPROVEMENT AND EXTENSION

The most urgent works only have been continued.

At and near Batavia the following works were in progress or have been completed : The main building of the new Passarsenen station has been roofed : The connection Manggarai-Tanahabang has been nearly completed and can be handed to the open line in a short time. The earth work to the lines Batavia to Angkee and Antjol to Tirem has been completed. The approach roads and squares near the freight yard of Tanahabang are under construction. The freight yard at Batavia station was nearly completed. A portion of the goods shed was ready for use. The two stations Batavia-North and Batavia-South will be closed. A new station, of which the survey and estimate are completed, will be constructed. Before starting the construction the whole traffic has to be concentrated at the station Batavia-North so that the station Batavia-South can be demolished. To that effect the Station Batavia-North is undergoing an important alteration. The construction of the main building of the station of Tandjong Priok is nearly completed, the station yard is in progress. Railway tracks on the harbor grounds have been added. Between Antjol and Soengeitiram a fifth track has been laid in behalf of earth supply and later on for separate freight traffic. At Manggarai some houses for the staff were completed.

At and near Sourabaya the principal work done is : The bridge over the Kali (river) Pagirian is in progress. The reinforced concrete piles of the viaduct over the Passarbesar street are completed. The bridge over the Kali (river) Mas is in progress. The engine sheds with offices at Sidotoppo and Kali Mas are completed. The gravity marshalling yard at Sidotoppo is completed. The work on a new storehouse for munition on the ground of the royal navy is commenced.

The work done *at Bandoeng* was : The deviation of the rivers Bangkok and Beunjeung near the station yard of Tjikoedapateuh and the canal which had for be dredged for that purpose, are nearly completed. Several sidings and spurs are completed. The station at Kiaratjondong was handed to the transportation. The auxiliary station yard is in progress. The parallel track between Bandoeng and Andir are completed. The house on the grounds which has been acquired for a marshalling yard at Tjimindi has been accommodated for a boarding-house for government officers. The building of a storehouse for the ticket printing office is commenced. The approach roads to the freight yard at Tjirojom have been metalled.

§ 4. ELECTRICAL BRANCH

In view of the advanced construction of the waterpower stations a decision has been made with regard to the current system to apply to the sections Tandjong Priok-Batavia-Meester Cornelis and Meester Cornelis-Buitenzorg. It is decided to apply direct current of 1,500 volt. The survey and plans of the section Tandjong Priok to Meester Cornelis were completed, so that tenders could be invited for the delivery of sub-stations, conduits and rolling stock. The electric light installation of the new freight yard at Batavia is completed. The installation at Tandjong Priok is commenced.

Tin Mines of the N. E. I.

COMMERCIAL working of tin deposits takes place on the islands of Banka, Billiton, and Singkep, situated off the southeast coast of Sumatra. The total production of tin in the Dutch East Indies during 1920 amounted to 21,991 metric tons, a small increase over the output in 1913 (21,200 tons). The was all produced by the government mines at Banka (13,427 tons), the Billiton Tin Mining Maatschappij (7,956 tons), and the Singkep Tin Maatschappij (608 tons).

The production of the Banka mines, which are owned and operated by the government, under the direction of the department of government enterprises, is by far the most important factor in the industry, since it amounts to nearly 60 per cent. of the total production of the colony. The latest statistics available regarding the Banka workings, compared with immediately preceding years and with the pre-war year of 1913, are:

Item.	1913 Number.	1918 Number.	1919 Number.	1920 Number.
Mines or pits	362	325	301	300
Average labor force	21,436	18,658	18,627	21,722
	Tons.	Tons.	Tons.	Tons.
Production	15,752	12,055	12,191	13,427
Tin auctioned in Holland	15,390	36	893	12
Tin sold in Dutch East Indies	—	10,934	15,047	9,326
Cost of production per picul, including freight and selling charges	Florins. 45	Florins. 50	Florins. 56	Florins. 59
Average selling price per picul:				
In Holland	152	228	189	204
In Dutch East Indies	—	204	176	195
Net receipts	36,566,674	36,277,380	46,227,847	29,025,717
Net profits	25,219,074	25,803,489	*	*

* Not yet made public.

No statistics are yet available for 1921 except for the number of mines or pits, 293, and the average labor force, 21,273 persons. Net profits for 1919 and 1920 have not yet been declared.

Banka Smelters—Marketing Government Tin

Contrary to what is done on Billiton, the tin of Banka is smelted on the island itself. Formerly each tin field had its own smelter, but during the last year smelting has been considerably centralized

and at present there are reduction plants only at Blinjoe. Besides the vertical kiln, which is still being used for smelting the ore (the so-called Van Vlaanderen furnace), the flame furnace has lately been put into operation in Banka, through which the loss of tin will be greatly reduced. The tin of Banka is considered to range among the purest kind found; a purity of 99.97 per cent. is guaranteed, which is, however, usually exceeded. There has long been an



Tin Smelting at Banka

agitation to concentrate all the tin smelting activity at one place, especially that with reference to the Banka and Billiton outputs.

Before the war all of the government [Banka] tin was shipped by the Nederlandsche Handel Maatschappij and auctioned in Holland, no sales being effected in the colony, but since that time all sales are conducted direct by the government through its bureau voor verkoop, departement van gouvernementbedrijven, at Weltevreden, Java. Low prices and a lack of demand have resulted in very large accumulations of tin stocks here and at Singapore, the total amount of which is difficult to estimate. A few months ago it was reported that the governments of the Federated Malay States and of Netherlands India had agreed to withhold stocks from the market until prices improved, or at least to limit the export to small quantities. It was also reported that the Banka and Billiton mines would be closed down pending an improvement in prices, but the latter report has not been confirmed.

The Billiton Mines

The tin deposits on the island of Billiton are operated by the Billiton Maatschappij under a concession obtained from the government in 1852 which in 1892 was extended for a period of 35 years, by virtue of which five-eighths of the net profits go to the colonial government in the form of a royalty. It is understood that the concession will not again be renewed by the government and that it definitely expires in 1927. It is generally believed that the government will continue the operation of the mines on its own behalf. The private interests controlling the Billiton



The Banka Tin Mines: Koba, Mine No. 35

Maatschappij have formed in Holland a new company called the Stannum Mining Co. with a capital of 500,000 florins (florin at par = \$0.402) for the purpose of taking over the machinery and equipment owned by the old company, probably with a view to operating in some other field after 1927.

The work is done by Chinese coolies under contract, the average number of laborers in 1920 being 18,000. In 1914 there were 47 mines or pits being worked, and in 1918 only 30. Production in 1913 amounted to 4,453 metric tons, in 1917 to 6,492 tons, in 1918 to 6,945 tons, in 1919 to 7,325 tons, and in 1920 to 7,956 tons. Electrical equipment has been installed for the working of the ore, the largest installation being at Manggar. The motive power at this station is furnished by six Diesel motors of 1,200 horse-power each.

The Singkep Mines—Exports from Java

The Singkep Tin Co. received its concession from the government in 1889. Besides the ore found on the island, important deposits were discovered under the sea close to land. These deposits are worked with dredgers, the mud being put through a preliminary concentration aboard and then further concentrated on shore. All of the Singkep production is smelted at Singapore. Production in 1913 amounted to 672 metric tons, in 1917 to 770 tons, in 1918 to 514 tons, in 1919 to 717 tons, and in 1920 to 608 tons.

Exports of tin from the island of Java (in metric tons) during the past three years were as follows:

Countries of destination.				1919	1920	1921
				Tons.	Tons.	Tons.
Netherlands	..	..	..	7,032	7,029	5,152
Great Britain	..	..	..	2,570	4,205	6,378
Germany	..	..	..	—	14	387
France	..	..	..	415	105	303
Japan	..	..	..	880	695	1,177
All other	..	..	..	5,355	1,600	142
Total	..	..	..	16,252	13,648	13,539

Mining in Siam

TIN and wolfram are the only metallic ores which figure in Siam's exports. Gold mining has been attempted, and rich deposits of lead and silver have been reported in north Siam, but the inaccessibility of the mining land has made the development slow. The sapphires which are named in the customs report (Tcs 2,569,762 in 1920-21) are mined by Shans at Pai-lin, French Indo-China, formerly Siamese territory, and are exported through Bangkok.

Modern tin mines are entirely in the hands of foreigners. Australian capital controls most of the tin workings, although some English, and a small amount of French and Danish, money is invested in tin. Chinese work numerous open-pit mines by hand but their operations are so irregular and their mines vary from two women panning ore in a creek to an organization employing a hundred coolies, that it is difficult to keep track of them.

The Siam Coal Mining Company, Ltd., which is about to begin operations at Bandon, Southern Siam, is the first all-Siamese mining company to undertake large scale workings.

Practically all tin ore mined in Siam is smelted at Penang.

Tin is produced in five provinces in Siam, viz., Puket, Surashtra, Nakon Sri, and Patani. Puket has always produced more than all the other provinces combined. For the year ending March 31, 1921, the figures were as follows: Puket, 87,605 piculs; Nakon Sri, 9,417 piculs; Patani, 6,186 piculs; Surashtra, 974 piculs.



The Banka Tin Mines: Koba, Mine No. 38

Nakon Sri also produced 1,936 piculs of wolfram ore at an average price of \$32.92.

The figures for the output of the last five years follow:

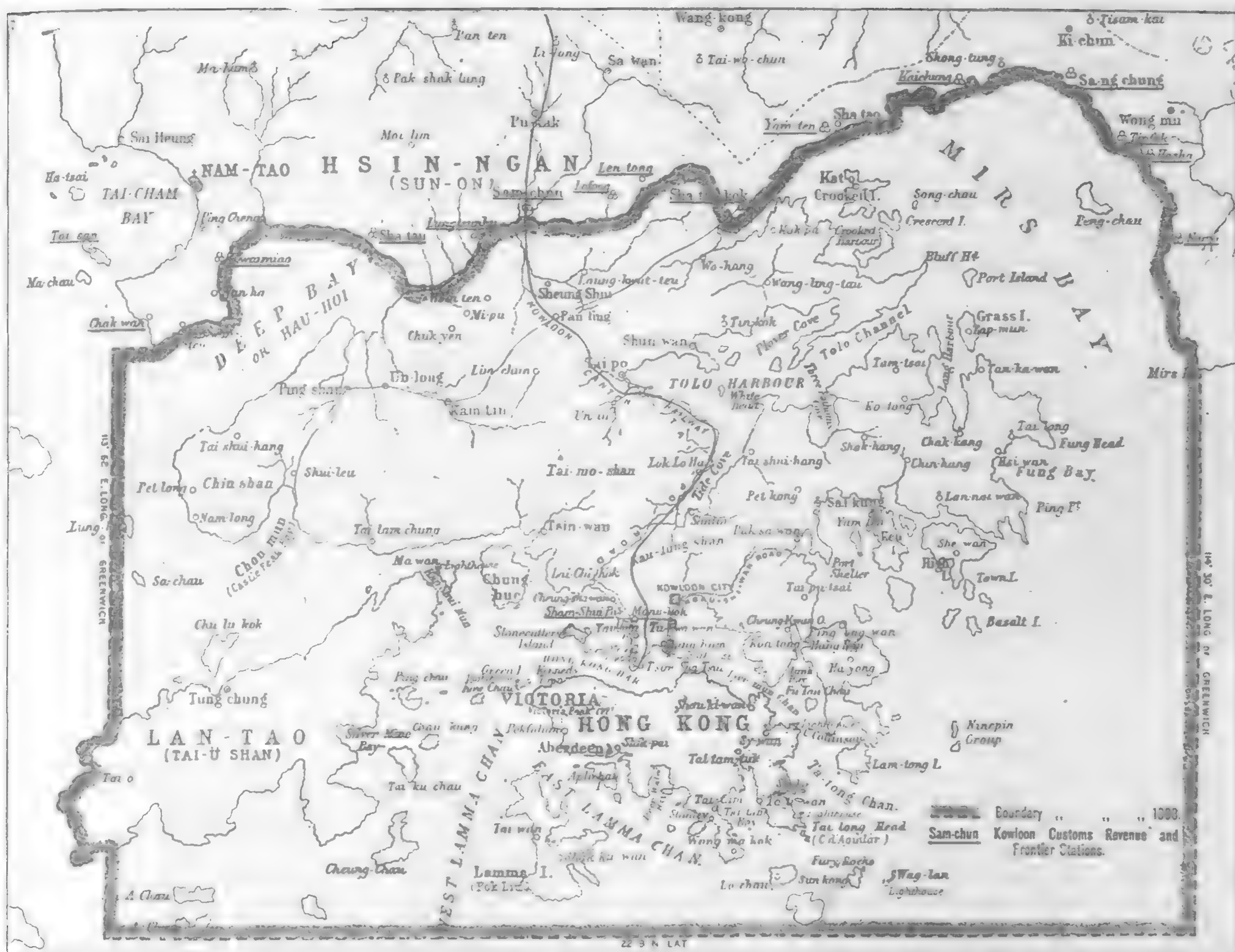
Year Ending March 31	Tin Obtained from		Total	Average Price in Straits Dollars Per Picul
	Dredging.	Other Sources.		
	Piculs	Piculs	Piculs	
1917 ..	47,298	99,961	147,259	89.00
1918 ..	51,343	102,439	153,782	22.00
1919 ..	52,124	96,301	148,425	147.84
1920 ..	74,993	68,513	143,506	148.30
1921 ..	59,013	45,170	104,183	129.95

TIN PRODUCTION BY PROVINCES IN 1922.

		April		Average Price	April	May
		April	May			
Patani	..	681	670	Tin	\$76.90	76.47
Nakon Sri	..	918	1,084	Wolfram	11.33	14.20
Puket	..	6,560	6,593			
Piculs..		8,159	8,347			

Diamond Mountain Electric Tramway

The Diamond Mountain Electric Railway Company is steadily pushing on construction work and the laying of track will be begun between Cholwon on the Seoul-Wonsan line and Kimwha, a distance of 18 miles, early next spring. The same Company has also obtained official permission to supply electricity to Seoul and Koyang district, and it is expected that the supply will be started by September of next year, when the electric railway traversing the district will possibly be opened to traffic. The Company has a nominal capital of five million yen and has the far larger portion of it still to be called for. In view of the present stringency of the money market the Company is apparently hesitating to call for further payment, and it is interesting to note that Dr. T. Kume, president, has recently sold his very fine property in Yoyogi, suburb of Tokyo, to Marquis Y. Tokugawa for two million yen with a view to investing the entire proceeds of the sale in the enterprise of his Company. It appears that the courage and firm determination of Dr. Kume accounts for the progress made by work the Diamond Mountain Railway Company as contrasted with the tardy, or rather lack of, progress made by certain other light railways organized about the same time, that is, when the war boom was at its height.



Map of Hongkong and the British Leased Territory of Kowloon showing Taimoshan and the Shing Mun River with outlet at Tide Cove, which it is proposed to impound and pipe the water down to Kowloon Point and thence by submerged mains across the Harbor to Hongkong

Great Waterworks Scheme for Hongkong

Water from Taimoshan Mountain

IN a leading article on the water shortage, the Hongkong *Daily Press* suggested that a solution of present difficulties would be found by "looking ahead and drawing the principal supplies for the whole colony from the mainland, and from the hinterland of the peninsula rather than from areas which may, within a century, be required for business or residential purposes." We have since gleaned information, says the *Daily Press* in a subsequent article, as to proposals now under consideration by the government for vastly increasing the water supplies of the colony and, whether they are adopted in their entirety or not, they undoubtedly show that the government's advisers are quite ready to take long views and to consider the requirements not of a decade or even a generation but of many years to come.

The chief proposal before the government does the very thing the *Daily Press* suggested; it taps the hinterland of the peninsula in a way that would put a very considerable supply of water at the disposal of the colony. The scheme has been in preparation in the public works department for a very long time. Plans have been prepared by the executive engineer of the waterworks, Mr.

R. M. Henderson, for collecting water for both Hongkong and Kowloon from Taimoshan mountain. The southern slopes have been selected as the catchment area and the large stream which at present finds its way to the sea at Shatin will be impounded. This stream has an average dry weather flow of over one and a half million gallons a day. In the Shing Mun valley two reservoirs, each with a capacity of about 1,000 million gallons, will be constructed.

A portion of the catchment area slopes away from the reservoir but by means of a catchwater this gathering ground, and the product of another fair sized stream, will be added to the scheme.

The catchment area can be still further enlarged when required by extending catchwaters to include other slopes of the mountain. Enormous volumes of water would thus be drawn upon.

Submerged Main Under the Harbor

From the two great reservoirs water would be brought down by conduit, and in some parts by tunnel, to a point very near the existing Kowloon filter beds. Supplies would be taken off for

Kowloon waterworks when that supply needed replenishment, and the remainder would be brought by iron mains to the harbor frontage at Kowloon point. The scheme proposes to bring the water across the harbor by a submerged main and a supply at good pressure can then be made to the lowest districts of the city of Victoria. It will be readily understood that there are difficult problems connected with laying a main beneath the harbor. A recent number of an engineering journal gave an account of damage done to such a pipe beneath New York harbor by the operations of a dredger. Important questions as to the length of life and replacement cost of such a pipe will also have to be considered.

Tunneling Through Hills

A scheme of the magnitude of the one here briefly outlined will of course take years to complete. Some portions of the operations are likely to be more difficult than others and to take a considerable time. Tunneling through intervening hills, when the water conduit is being constructed will be a very arduous business. But, since the course of the channel will be known, the tunneling can be begun at the first possible moment. It is bound to be a slow business since only a limited number of people can work at the face of a tunnel, and obtaining additional faces by sinking intervening shafts would greatly add to the cost of the work.

Providing for Immediate Needs

The proposals now before the government also provide for more immediate necessities. It is proposed that *pari passu*—as the lawyers say—with the large scheme just outlined, extensions shall be made at Kowloon reservoir and additional catchment areas brought into service on the island of Hongkong. So great is the increase in population and the demand upon the water supplies that, if extensions of existing undertakings were not put in hand the demand would greatly exceed the supply long before the Taimoshan scheme was completed. If the big scheme is put in hand, however, the extensions of existing works can be framed on relatively less expensive lines. It is proposed to provide an additional reservoir at Kowloon, as it will be possible to construct one to contain 100 million gallons or thereabouts, at a comparatively moderate cost. An extension of the catchment area will also be made there.

On the island, another 2,600 acres can be added to the catchment area of the Taitam-Wongneichong chain of reservoirs. Some idea of the additional quantity of water that would find its way to the reservoir may be gathered from the fact that one inch of rain over such an area would represent about 60 million gallons, and any springs or streams within the area would be additional. According to the report of the committee which recently considered the feasibility of extending the water carriage system, the inclusion of this 2,600 acres would increase the supply at Taitam (without further reservoirs) from its present figure of 7 millions to 10 millions a day. "The Kowloon Works," this report states, "will produce 1.7 million gallons a day in the driest recorded year and can be considerably extended at a comparatively small cost. The present supply is about 1.7 million gallons a day."

Estimates of Future Requirements

These figures give the clue to the need for extension of the colony's water supplies. The percentage of increase in consumption in Hongkong in 1921, compared with 1912 was over 72 per cent, and in Kowloon 69 per cent. But a considerable proportion of this increase accrued in the last three years of the period. If the years 1918 to 1921 are taken, the percentage increase of consumption for Hongkong is 29 per cent. and for Kowloon nearly 36 per cent. If the rate of increase of consumption of those three years continue, the daily consumption in 1924 would be: in Hongkong, over 10 million gallons a day—an aggregate increase of 900 million gallons;

and in Kowloon, nearly 2½ million gallons—or an aggregate annual increase of nearly 250 million gallons per annum.

In other words, the demand of Hongkong in 1924 if the increase of consumption is not checked is expected to be, even then, in excess of the 10 million gallons a day that the recent committee said the island waterworks would provide if the 2,600 acres of additional catchments were all in full operation. Hence the necessity for the Shing Mun valley scheme and for the pipe line across the harbor.

As for Kowloon, the 2½ million gallons a day which the district is estimated to need in 1924 will not be fully met by the extensions proposed, and Kowloon, also, will draw largely upon the Shing Mun scheme for supplies, as soon as they are available. If meters are introduced in the meantime, some reduction in the demand may result, but too much must not be expected on this account as the extraordinarily rapid development of the colony makes much of the increased demand inevitable.

It is too early yet to give any estimate of the cost of the schemes proposed. The sum is bound to run into many millions of dollars but ultimately the colony may expect to have the ample water supplies necessary for public use and for maintaining the water service to the port.

Cost of Building in the Straits Settlements

MR. J. H. W. Park, colonial engineer, writes as follows in his annual report:—

In the 1919 report my predecessor gave some interesting figures in regard to recent changes in prices of labor and materials. Such figures, however useful, do not convey to the mind the effect they have on construction of public works. I have recently had tables compiled showing the cost of similar works or buildings in the various settlements during the last three years. It is not possible to refer to these in detail but a single instance will suffice.

The cost of building a first-class quarter in Singapore containing 6,000 square feet of floor space, 1,125 square feet of outbuilding and 150 feet of covered way complete with water, electric light, tennis court, road and fence but not including land, sewers or piled foundations, was in May, 1919, actually \$21,256; in August, 1920, this cost became \$57,619; while in May, 1921, it was \$38,846. These figures are from accepted tenders.

When it is remembered that public works officers have as a rule to prepare estimates between June and October for works to be undertaken probably between March and September of the following year their difficulties in the face of the variations in price thus disclosed are obvious. Actually for 1920 they provided \$21,000 per house while for 1921 there was allowed \$41,250.

I judge 1919 building prices to have been 20 per cent. on the average above those of 1916 while those of 1920 were 150 per cent. and those of 1921 about 75 per cent. above the corresponding ones of the same year. On these figures the building program of 1919 was double that of 1916 while that of 1921 was four times greater than that of the same year.

It is possible to apply somewhat similar reasoning to roads where prices are mainly dependent on local labor and it is not difficult to deduce therefrom that road work has probably increased about 75 per cent.

These considerations show very clearly how the duties of individual members of the department have been added to in recent years.

Liuchang Coal Mines

THE Liuchang coal mines are located about 13 miles north of Chinwangtao and connected with the port by a 30-in. narrow gauge railway. These mines have a daily output of 400-500 tons, mined from two inclined and one vertical shaft. The two inclined shafts are each equipped with a 40 H.P. hoisting engines. There is

lines. In addition, there are two five-inch pipe lines connected to steam pumps, which are to be replaced in the near future by electrically driven pumps.

The railroad equipment consists of three 10-ton Vulcan locomotives, one 20-ton Baldwin locomotive with tender and one 20-ton Borsig locomotive on order and which is expected to arrive



View from East Mountain



View from South Mountain

LIUCHANG COAL MINES, 1922

also two ventilating shafts and one auxiliary shaft with a small winch.

The machine shop is equipped with a 15 H.P. engine, lathes and other machine tools to take care of repairs. A



Baldwin Locomotive Hauling Coal Train of Koppel Cars

shortly. Forty-four 4-ton steel coal cars and twenty 10-ton wooden coal cars complete the rolling stock. The mine cars consist of 100 wooden and 125 steel coal cars. The rail-



Inclined Shafts and Screening Plant



Reinforced Concrete Trestle Bridge at Kouchang

model-making room, blacksmith shop, foundry and fitting room round out the shops. The battery of boilers of the Lancashire type, produce 450 H.P., while a 10 kw. set lights the mines.

In the mines are two stage pumping plants that take care of the two 8-in. pipe



South Vertical Shaft

road bridges are of the trestle type, most of which are of reinforced concrete, of which material, some of the culverts are also made.

The head office of the company is located in Shanghai. It is capitalized at \$1,440,000. of which \$1,000,000 has been paid up.

The Master American Builder in Japan

The Work of the George A. Fuller Company of the Orient, Ltd.

JAPAN emerged from the war with a lost amount of world trade at her door and an acute shortage of buildings to house her increased business. For the last two years her representatives have been studying the building methods of Europe and America and they have decided that the made in America business buildings are superior to all others and thus about seventy years after Commodore

cities in Japan. The concern selected was the George A. Fuller Company.

If the Japanese had entered the offices of the Fuller Company merely to award a contract or so for the construction of modern office and business buildings in Tokio it is likely that they might still be looking for some one to accept those contracts as it has been a more or less well defined policy of the company to centre



The New Home of the Great Mitsubishi Company of Tokyo, the largest Office Building in Asia

Perry of the United States navy opened up the ports of Japan to American commerce the Nippon kingdom is opening its doors to the best brains of the United States in the business of erecting monuments of steel, concrete and granite dedicated to the god of business and trade.

The honor thus conferred on the United States was actually unsought. For many months the Japanese were in the United States canvassing the field and finally decided on a prominent New York firm of builders as being best qualified to organize the business of putting up American business buildings in Tokio and other big

its attentions on building operations in the United States rather than in foreign lands.

But the Japanese came to the company seeking help instead of bearing gifts in the form of contracts. Their commissioners made plain at the outset that they wanted the American builders to go to Japan and teach the Japanese the best and most modern methods of building in order that Japan might start on her campaign of modernizing her great cities at the present point of efficiency and perfection reached by the American builders. They signified their desire that the Americans should go to Tokio not merely as

builders but as teachers to train and educate the Japanese architects and engineers in the school of modern American construction methods.

This modern Macedonian call, according to the Fuller Company officials, could not easily be ignored. Arrangement to take over a complete American organization to Tokio, therefore, were made. The organization was called the George A. Fuller Company of the Orient, Ltd. Many prominent Japanese business men, architects and contractors are interested in the concern. Baron Shibusawa, a member of the recent peace commission, and Baron Kondo are among the directors.

"As far as fundamental methods are concerned," say the officials of the George A. Fuller Company, "the buildings which the the Orient, Ltd., are completing in Tokio differ little from those which the Fuller Company has been erecting in the United States during the last few months. Of course, the prevalence of earthquake troubles, although not always violent, necessitate the use of much heavier steel parts. Each of these structures forms as near as is practicable a modern American fireproof type of office building and at the same time keeps them in conformity with the customs and laws of Japan. The building law of Tokio limits the heights of all structures to 100 feet from grade to top cornice. All



Magnificent New Head Office Building of the Nippon Yusen Kaisha, whose Steamers carry the Flag of the Rising Sun on all the Important Trade Routes of the World

This is the first real step to Americanize the construction and building business of Nippon. According to the officials of the Fuller Company, the Japanese are exceedingly adaptable to the task of assimilating the American methods. They seem to display practically no desire to cling to tradition in architectural motifs or engineering methods.

The organization which the Fuller Company took to Tokio included several Japanese who had studied building methods in New York and other American cities. Since it reached Tokio it has taken on a large number of Japanese architects and engineers who are students of every engineering job. In fact, the operations, now going on in Tokio, are schools for native Japanese engineers and architects throughout the empire.

the structural steel work was designed, fabricated and shipped from the United States."

Marunouchi Building

The largest operation on which the Company is engaged is the Marunouchi building, owned by the Mitsubishi Goshi Kaisha in the Marunouchi district. It is to be used exclusively as an office structure, is the largest structure of its kind in Asia, as it covers a plot measuring 300 by 350 feet, is eight stories high and is of structural steel with reinforced concrete arches and cement floors.

The exterior of the structure consists of a granite base succeeded by a story of architectural terra cotta and above that by six stories

of brick work faced with the Japanese type of finishing tile, which comprises the shaft of the building. The remaining story tops the building and is made of cement stucco work. The architect is Dr. Kotaro Sakurai. The cost of the structure will be approximately \$5,000,000. It will be completed in December, 1922.

Area : Basement	77,864 sq. ft.
First floor	77,864 " "
Second floor	72,792 " "
3, 4, 5, 6, 7 and 8th floors	436,652 " "
Ninth floor	12,544 " "
<hr/>	
Total	677,716 sq. ft.
9 stories : Tsubos	18,825

The main cornice is of ornamental reinforced concrete. The parapet over the main cornice is of reinforced concrete faced with ornamental artificial stone.

The interior partitions are of solid brick, hollow brick reinforced with steel, reinforced concrete, hollow terra cotta tile reinforced with steel and steel studs with metal lath and cement plaster.

General Features : Basement.—Boiler room ; coal room ; kitchen ; café and dining room ; store rooms ; motor generator room ; transformer room ; pump room ; battery room.

First Floor.—Stores opening on all four elevators. Two passage-ways or arcades—one running north and south, the other east and west, intersecting at the centre of the building. Both sides of arcades lined with stores. Elevators open to large elevator



Seven Story Structure Erected for the Japan Oil Company in Tokyo

General Construction.—Foundation composed of American wood piles 45-ft. to 55-ft. in length with heavy caps or footings of reinforced concrete. Superstructure is of steel skeleton frame throughout, with reinforced concrete floors and all steel protected from fire and dampness with reinforced concrete covering.

Exterior walls at the first floor are constructed on heavy brickwork faced with granite and artificial stone. The exterior walls from the second to the seventh floors inclusive are constructed of heavy brick and reinforced concrete faced with a light buff colored facing tile. The walls at the eighth floor are faced with ornamental cast stone and backed up with brickwork and reinforced concrete.

lobbies. Arcades and elevator lobbies finished with marble walls, ornamental plaster ceilings and heavy tile floors.

Second to Ninth Floors, inclusive, are for general offices to be rented. All offices to have linoleum floors on cement with white plastered walls and ceilings. All offices are outside rooms. Toilet rooms are provided on each floor equipped with high-grade American-made white enamelled toilet fixtures. These rooms have walls of glazed tile and terrazzo floors.

Mechanical.—Two septic tanks ; ten passenger elevators ; One freight elevator (electrically operated) ; steam-heating plant in basement with radiators in each office ; mail chutes ; motor

generator sets; pumping plant for water supply; complete electric light and power system; telephone system, all offices; kitchen and cooking equipment; dining and service rooms; gas supply where desired.

Building started, November, 1920. Completed, December, 1922.

Japan Oil Building

The Japan Oil Company building, which is being erected for the Japan Oil Company, Ltd., Tokio, Japan, is a seven story office building of steel skeleton construction, with reinforced floor arches and cement floors. Sone & Chujo are the architects. The cost is approximately \$1,500,000 and the date of completion June 15, 1922.

Area : Basement	26,565 sq. ft.
First floor	26,565 ,, ,,
Second floor	23,541 ,, ,,
3, 4, 5, 6 and 7th floors	117,705 ,, ,,

Total 194,376 sq. ft.

7 Stories and Basement : Tsubos 5,400

Construction.—American wood piles, 45-ft. and 50-ft. long, capped with heavy reinforced concrete footings supporting the skeleton steel frame. Steel frame fabricated in and shipped from the United States. Floors of steel beams and reinforced concrete. Exterior covering consists of granite base courses with *tsukide* stone to the level of the third floor. Remainder of exterior walls are of American architectural glazed terra cotta backed with solid and hollow brick. Roof is of felt and gravel with sheet copper flashings. Interior partitions are of reinforced concrete and hard burned hollow terra cotta blocks.

Features

Basement.—Steam-heating plant. Garage, 36-ft. by 56-ft.; kitchen and service rooms; barber shop; dining rooms; motor generator and pump rooms; store rooms.

First Floor.—Two main entrances furnished in marble, terrazzo and ornamental plaster. Large grand hall in marble, terrazzo and ornamental plaster, with solid marble grand stairs and bronze ornamental balustrade and ornaments.

Two large banking rooms (Sumitomo and Mitsui) equipped with reinforced concrete vaults and Mosler steel combination vault doors.

Telephone room with three booths, post office, two stories cigar and news stand.

Second Floor.—Three banking rooms and miscellaneous service rooms.

3rd, 4th and 5th Floors.—General offices—rented. Linoleum floors on cement, white plaster walls and ceilings. Tiled walled toilet rooms on each floor with enamelled Japanese style and American fixtures. All offices with windows opening to daylight.

6th and 7th Floors.—General and executive offices of the Japan Oil Company. Same general features and conveniences as other floors.

Mechanical.—Septic tank; 4 passenger elevators; 1 freight (electrically operated); Steam-heating plant with radiators in all offices; modern system of toilet fixtures and plumbing installation; motor generator sets; complete telephone system; mail chute; All electric wiring enclosed in steel conduits and wiring installed after conduit work has been completed; 68 offices—but entire building not yet subdivided.

Building started, October, 1920. Completed, August, 1922.

Yusen Building

The next building is also an office structure for the Nippon Yusen Kaisha (Japan Mail Steamship Company), also in the Marunouchi district of Tokio. The site is approximately 160

feet by 300 feet and the structure seven stories high. The building is also of structural steel, skeleton type, with reinforced concrete flat arches, cement floors and architectural terra cotta exterior over a granite base. The architects are Sone & Chujo. The cost of the building is approximately \$3,000,000, heating, plumbing, ventilating and electric materials, mail chutes, copper and kalamein iron fireproof, doors, jambs and it is expected that it will be ready for occupancy in December.

Net Area : Basement	44,352 sq. ft.
First floor	44,352 ,, ,,
Second floor	35,904 ,, ,,
3, 4, 5, 6 and 7th floors	179,520 ,, ,,

Total 304,128 sq. ft.

7 Floors and Basement : Tsubos 8,450

Construction.—American wood pile foundations with heavy concrete caps and footings, supporting the structural steel skeleton frame. Floor construction throughout is composed of steel bearing beams and girders which support the reinforced concrete floor slabs. All steel throughout encased and fireproofed with reinforced concrete.

Exterior facing at the first floor of the north-east and west elevations are of granite, supporting American-made architectural glazed terra cotta. This terra cotta continues to the parapet above the main roof. The terra cotta is backed with solid brick with the four inch inner face laid up with hollow brick, to exclude the presence of dampness.

The entire south elevation is laid up in solid brickwork which is covered on the exterior with cement stucco laid off and jointed to represent stone courses. The interior partitions are constructed of reinforced concrete, hollow fireproof tile reinforced with mesh and steel channel and metal lath, all finished in white plaster. The roofing material consists of felt and gravel with certain portions covered with a vitreous tile laid in asphalt.

General Layout.—The basement is occupied by the boiler room, printing room, store rooms, garage, 24-ft. by 66-ft., offices and miscellaneous coal and other rooms containing mechanical equipment.

First Floor.—Passenger department; finance division; supplies division; shareholders registry offices; accounting department; public lobby.

Second Floor.—General Executive Offices.

3rd, 4th, 5th and 6th Floors.—Rentable office space.

Seventh Floor.—Large assembly hall, dining room, kitchen.

Mechanical Features.—Six passenger, one freight and one service elevator, all electrically operated; septic tanks; steam-heating plant; garbage disposal system; motor generator sets; modern toilet rooms, equipped with high-grade white porcelain fixtures; complete telephone system; latest American kitchen ranges and appliances; complete equipped service and dining rooms; mail chute; electric lights throughout.

General.—Main entrances: marble wainscot, ornamental plaster cornices, marble and terrazzo floors. All woodwork in first floor will be teak. Upper floors will have cement flooring covered with linoleum. Walls and ceilings finished in white plaster. All woodwork to be of oak finished with varnish. American hardware used throughout—solid bronze. Building absolutely fireproof.

Building started, November, 1920. Completed, December, 1922.

The smallest structure is the Crescent building, Kobe, Japan: owners. Brunner, Mond & Co. (Japan), Ltd. The size is 90 feet square and it is six stories in height. It is an office building of reinforced concrete, flat arch construction and terra cotta front. The approximate cost will be \$300,000. The company acted in the combined capacity of engineers, architects and contractors for the building.

Among the many additional materials and trim, polished plate and wire glass, sash chain and fixture, wire cloth reinforcing material, kitchen, equipment, vault doors, finishing hardware, directory boards and linoleum.

The Han River and Its Levees

By H. S. Chuck, A.B., C.E., A.M. Am. Soc. E.C., M.A.C.A.E.

WATERWAYS, including rivers and canals, form one of the most important group of assets contributory to the wealth and progress of a nation. They serve as the common means for the transportation of the produce from the producers to the consumers, thereby linking the inland commerce with that of the outer world. Being essentially an agricultural nation, China should look more to her waterways as the cheap and quick means for the transportation of her agricultural products. She is blessed with large rivers which she may develop to their full advantage to accomplish her ends—the Yellow river feeding the north; the Yangtze river, the central portion; and the Pearl river, the south. But it is regrettable to mention that, in recent years, so very little or no attention at all has been given to their improvement, whereby such results could be effected.

Historically, China, by no means, can be said to be backward in the development and improvement of her water courses. The grand canal is a gigantic engineering scheme. She had at one time in her history an emperor who did so much good work towards the conserving of rivers that he is now made a god.

Through the opportunity given me by the China international famine relief commission, committee for Hupeh, as the chief engineer, to take charge of all the levee construction and repairs along the various points of the Han river, from Hankow to Siang Yang, during the spring of 1922, I had the fortune to avail myself of the opportunity to become acquainted with the general conditions and the general characteristics and phenomena of the lower part of the Han. It is upon the knowledge which I thus gained during this short period that the following information is based.

General Description of the Han River

The Han river rises from its source in the province of Shensi, in the mountains forming the provincial boundary between the province of Szechuan and Shensi as well as the water shed between the Han river and both the Yellow and Yangtze river systems, these mountains surround a large plain, known sometimes as the Han Chung plain. For about fifty miles, the Han river flows through this plain. Then it enters into a mountainous district of about three hundred

and fifty miles long. In this mountainous district, the bed of the river is rocky. The channel is narrow, obstructed by numerous bad rapids, and, at some stretches, confined by gorges. From the neighborhood of the town Yun Yang, which is about half-way between the source and the mouth of this river, the country downwards become less hilly. The country of the lower half of the Han river is generally flat. Being almost entirely of an alluvial nature, it differs entirely in characteristics from the upper portion of the Han river.

From its source to the town of Siang Yang, a distance of about six hundred miles, the general direction of the river is easterly. Then it flows in a general south-easterly direction for a distance of about one hundred and fifty miles, to the village Tsuk Kow, in the neighborhood of Chin Chiang Hsien. From this point to its mouth, at Hankow (meaning the mouth of Han), the general direction of the river is again easterly. The total length of this river is approximately nine hundred miles, draining an area of approximately sixty thousand square miles.

The principal tributaries of the Han river are: the Fu Ho joining the Han at Hsin Kow, the Pei Ho and Tang Ho just below the town Fen Cheng, the Nan Ho joining the Han at Ku Cheng, the Tan Chiang about fifteen miles above Laohokow, the Tu Ho about ten miles above the town Yun Yang, the Hsun Ho joining the Han at Hsun Yang, and the Ta Pei Ho just above Han Chung. The special significance of three of the tributary systems is worth mentioning. The Tan Chiang, the Pei Ho and the Tang Ho drain a large territory in the province of Honan, and these rivers serve as some of the principal trade routes for the inland commerce between the provinces of Honan and Hupeh. The water of the Fu Ho not only flows into the Han river but also, through a series of lakes and creeks, into the Yangtze river by the Seven Mile Creek in the neighborhood of Shen Chia Chee.

Records show that the difference of water stages reaches twenty-five feet at Fen Cheng, twenty-seven feet at Sha Yang and thirty-one feet at Sien Tao Chen.

This study chiefly concerns the lower part of the Han river. Therefore, the descriptions which follow are limited only to this section of the river, especially between the cities of Siang Yang and Hankow.



New levee constructed by the International Famine Relief Committee during spring of 1922, showing banquette of levee on land side



A break of the levee at Tsien Chia-wan during summer flood of 1921

The Lower Han

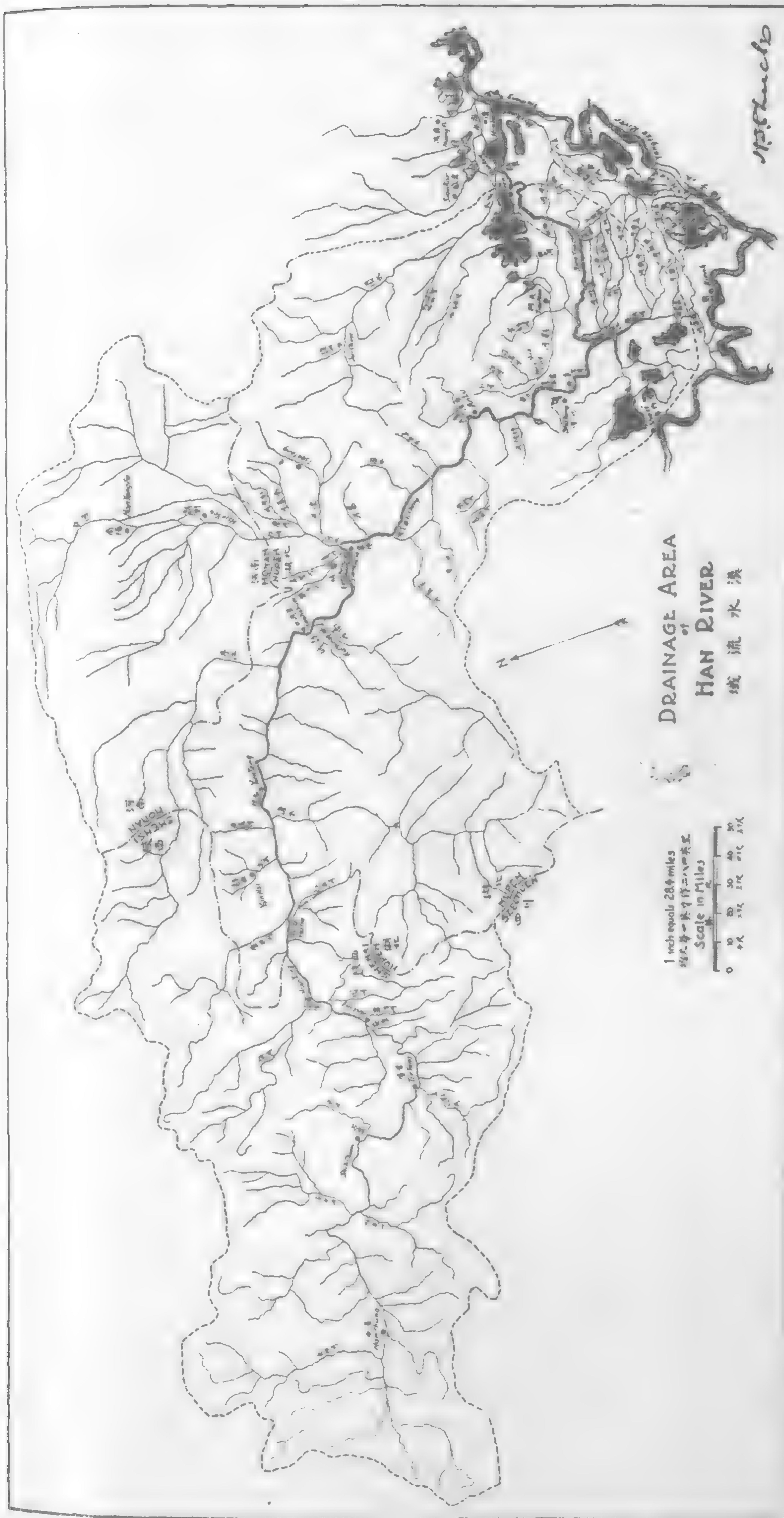
The Lower Han is a silt-bearing river, flowing through a basin of alluvial and sand deposits. The belt of country which is subject to the overflow of this river varies in width from a couple of miles to about fifty miles. The deposits of this country are generally sand and clay or a mixture of these materials and occasionally gravel. The gravel deposits are generally found between the towns of Yi Cheng and Siang Yang.

The course of the Lower Han is characteristic of its kind, consisting of a series of bends of varying magnitude and curvatures, and straight stretches between the bends. The channels at the bends are generally more definite and much narrower than those of the straight stretches. At the bends, the deep water is always near the concave side of the bank. The channels are generally wider at the straight stretches. On this account, the velocity of the current in the straight stretches is generally slack, resulting in sedimentation, forming chutes, islands and bars. These are constantly washed away by the high water and formed again, thereby causing what is known as the "shifting bottom" of the river.

Between Siang Yang and Anlu, the river practically runs wild. Although there is a rather definite low water course, limited only by sand banks, the high water generally floods the lowlands for miles on either or both sides of the river. These lowlands are generally sandy and a few stretches are of gravel deposits. At some localities the land is clay. Wherever the land is of clay, it is generally high, sometimes above the ordinary high water level. The right bank between the towns Yi Cheng and Siang Yang is of this nature. The river bottom of this section of the river is most unstable. It shifts constantly even at the slightest fluctuation of water levels. This renders navigation on this part of the river very difficult and uncertain.

There are few ranges of low hills, some of which are located along the river bank and others, a few miles away. Wherever a range of hills is located on one side of and near to the river bank, the opposite side is always low flats, invariably of sand, stretching out for miles and subject to the overflow of the river even at average high water stage.

Chiefly on account of that the banks are mostly of clay, the channels of the section of the river between



Drainage Area of the Han River

Anlu and Hankow, with the exception of a short stretch near Sha Yang which is sandy, are more defined. The low water channel is fairly defined and regular and the high water is confined within limits with levees. During extreme high water stage, the lowlands behind the levees are sometimes twenty or thirty feet below the high water level. This is what accounts for the grave danger at the time of high water stage and the disastrous results in case of a break in the levee. The country made up by the districts, Shao Kan, Yin Cheng, Kin Shan, Tien Men and Han Chuen, is a large area of flat lowlands full of shallow lakes with a few sprinklings of low hills. The natural drainage of this area of lowlands is from Anlu south-eastwards towards Hsin Kow. Between Anlu and Hsin Kow, the Han river has practically no tributary to drain these lowlands. In fact, they are hemmed in by an almost continuous levee to prevent the overflow of the Han. The only outlet of this large drainage area is the Fu Ho, located at Hsin Kow. A glance at the map will show the readers immediately, the disaster which may be brought to this large tract of land in the case of a break in any portion of the levee between Anlu and Wong Chia Ying.

Han Chuen district, being the lowest and located at the immediate outlet of the flood water always suffers the heaviest. The successive breaks of the levee at Wong Chia Ying during the summers of 1919 and 1921 had

brought untold sufferings to these districts, and Han Cheun, the greatest.

The mouth of the Han river where it empties into the Yangtze is too small to take care of the water of the river during high water stages. In time of freshet, the current of the water at this locality sometimes develops to such a high velocity that it is extremely dangerous for navigation of small crafts. On account of the commercial domination of the land near the mouth of this river, it may be financially impossible to widen this part of the river. On this account, a relief canal may be helpful. A proper survey will show immediately the feasibility of such a scheme.

At present, the Han river has another outlet into the Yangtze river through the Tung Kin Ho by the way of Chin Chiang district. This outlet connects the Han river at the village Tsuk Kow and the Yangtze at Ching Tan Kow about 180 li below Hsin Tee. Another possible location for a relief canal is through the series of lakes and canals west of the city of Hankow, connecting the Han river at

Hsin Kow and the Yangtze by the Seven Mile Creek in the neighborhood of Sher Chia Chee.

Levees

Levee is a common name given to the system of earth embankments built along the sides of any river of alluvial character for the purpose of preventing inundation of the lowlands situated on the sides of the river. Some of the most notable levee systems of the world are those of the Po river in the northern part of Italy and the Lower Mississippi of the United States. Such a system of levees, although not so scientifically well built and maintained, is found along both sides of the Lower Han river. As having been noted, the Lower Han flows through an alluvial plain, varying in width from a few miles to about fifty miles. The system of levees is, therefore, to serve the same purpose as those of the Po and Mississippi; namely, to protect the

lowlands from inundation.

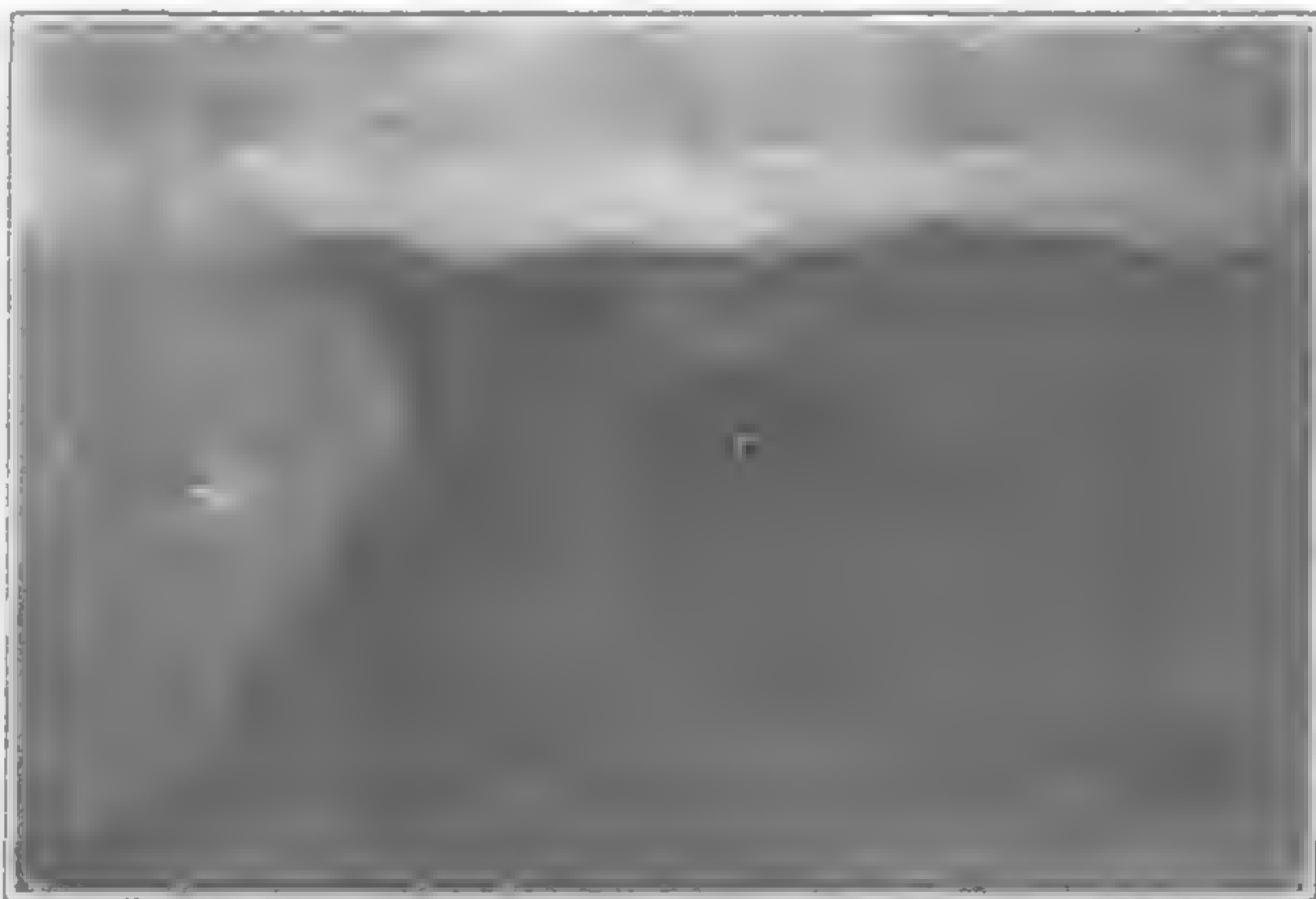
According to ownership, the levees of the Lower Han may be classified into two classes: the people's levee and the government levee. The cause of these classes of ownership has never been clear in my mind but may be explained as follows: Originally, all levees were built by the government. As time progressed, when the financial demand of

other sources, not necessarily more worthy, became heavier, the ability of the government to do public service was much curtailed. During such time of emergency, when the government was thus rendered helpless, the responsibility of levee repairs and construction naturally fell upon the people.

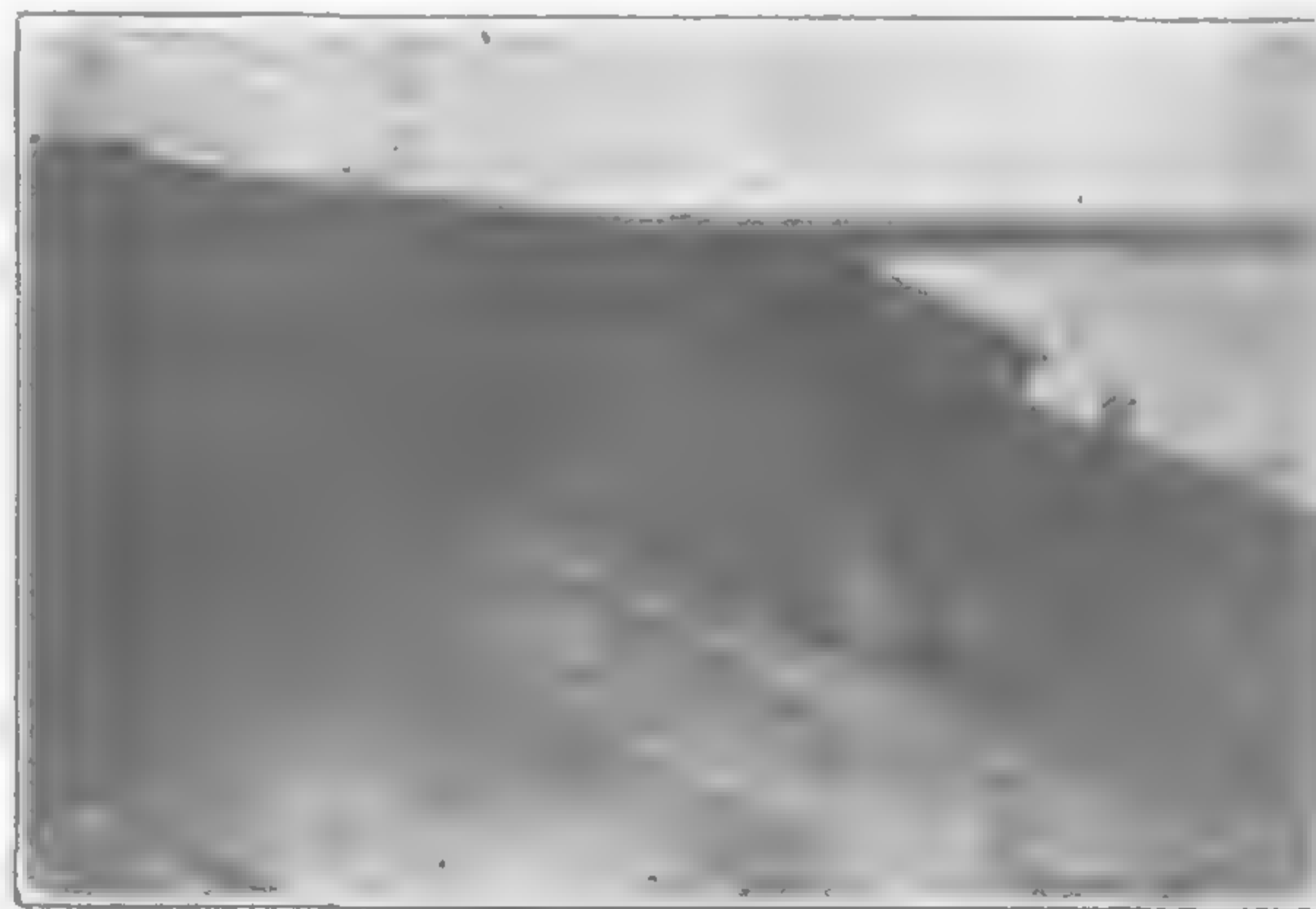
In general, it may be stated that there are two main objects in the construction of levees: first, to confine the flood water of the river within a certain channel, and, secondly, to protect the farm land on both sides of the river from inundation. To serve these two purposes, it may be said off-hand that the best system of levee that can be built is to follow closely to the river bank. This view may be accepted as sound and wise if the river should keep to its banks constantly. But this is impossible in nature. Banks are constantly eroded and the river constantly changes its course. On this account, levees are generally located at some distance from the river bank. The rapidity or the rate of erosion of the bank in front of the levee is a large determining factor upon the question



Method of earth tamping in levee construction at Tsien Chia-wan. A stone about 70-lbs. in weight is lifted and let fall on the loose earth



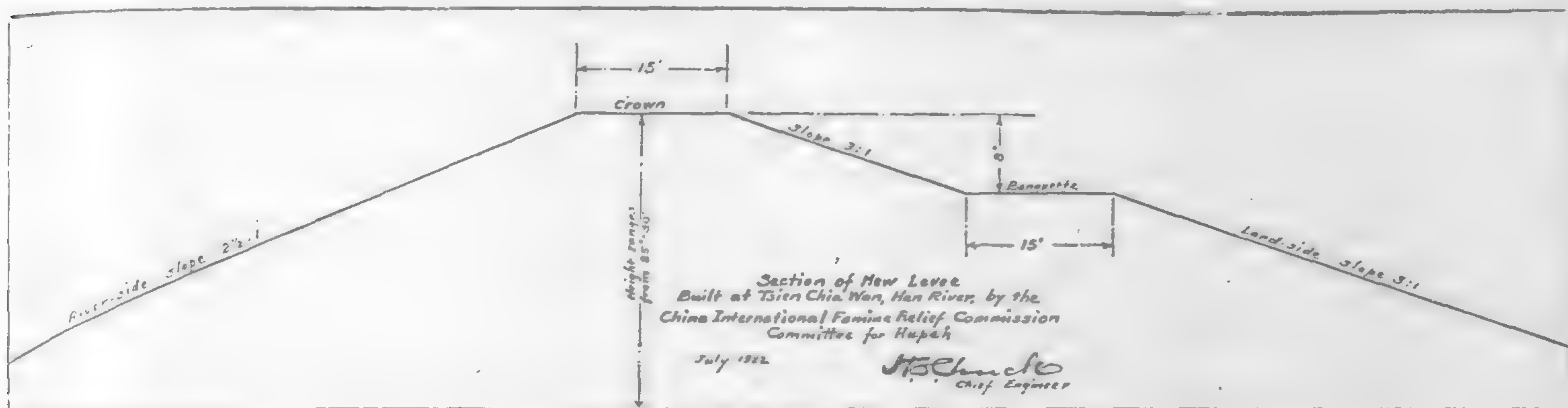
Bank caving near Tsien Chia-wan



Low water bank properly sloped for revetment; near Tsien Chia-wan



Method of punishing offenders in levee construction



Section of New Levee

of levee location. A rapidly caving bank, especially along the concave bend of the river, shortens the life of the levee back of it, unless the bank is properly and strongly reveted. All other points being favorable, the economic consideration of the location of a levee to be built between two points is to follow the curve of the river thereby increasing the length and cost of the levee but enclosing and protecting more land or to build it in a straight line there—reducing the length and cost of the levee and leaving some land unprotected. All these questions require thorough study into the local conditions and behavior of the river as well as experience. It is generally accepted by best authorities on levee location that any levee having a life of twenty or thirty years is wisely and economically located.

Chiefly due to the lack of unanimity in action or the lack of central control, the types and cross section of the levee built in the different districts along the Han river vary. The crown width varies from ten to thirty feet and the side slope from 1 to 1 (1 foot horizontal to 1 foot vertical) to 3 to 1 (3 feet horizontal to 1 foot vertical). The slope generally used is $2\frac{1}{2}$ to 1 ($2\frac{1}{2}$ feet horizontal to 1 foot vertical).

On account of the shortness of time when I was connected with the works of this river, it is rather too soon for me to say just what is the best and most economical section to be used for this river. The adoption of an economical section requires some time for the study of the local conditions, behavior of the existing levees and the soil. No doubt, the most economical section is one that involves the smallest amount of earth-work (cheapest) and will resist the hydraulic forces of the river with the greatest efficiency. I have, however, an opportunity to try out one section at Tsien Chia Wan. This new section differs from all the existing sections at present used along the Han river, the new feature being the introduction of a banquette of fifteen feet wide of the land-side of the levee. This section has a crown width of fifteen feet, a river-side slope of $2\frac{1}{2}$ to 1 ($2\frac{1}{2}$ feet horizontal to 1 foot vertical) and a land-side slope of 3 to 1 (3 feet horizontal to 1 foot vertical). The banquette is 8 feet below the crown.

I have noticed that chiefly due to an improper knowledge of the behavior of the hydraulic forces of the river, some very abrupt points, like the bank-heads, were built out from the levees which were located near to or at the low water bank, extending into the river from ten or twenty feet to about a

hundred feet. These bankheads were constructed with earth and strongly protected with rock facings and sometimes with pile foundations. The local name for these bankheads is "chee tow." The bank immediately above and below the "chee tow" is sometimes protected with stone masonry but most times not. The popular opinion of the "chee tow" is that it will deflect the current of the river to the opposite bank, thereby protecting the bank on the same side and below the "chee tow." This idea of the protecting power of the "chee tow" is certainly erroneous. The effect of the "chee tow" is exactly the same that of a "false point." The tendency is the development

of an eddy current on the down-stream side of the "chee tow" thereby causing the bank below it to be eroded. The effect of the "chee tow" is therefore exactly the opposite to the local popular conception. A very good proof of this erroneous conception of the protecting power of the "chee tow" is seen at Sze Tze Kow (see illustration below) where the levee, forming the river bank below the "chee tow," being unprotected, has about half of its section eroded away during the flood of 1921, almost causing a catastrophe.

The levees of the Han river are built with clay or a combination of sand and clay. At some localities, where the deposits are all sandy, earth is transported from a distance, sometimes as far as a couple of miles.

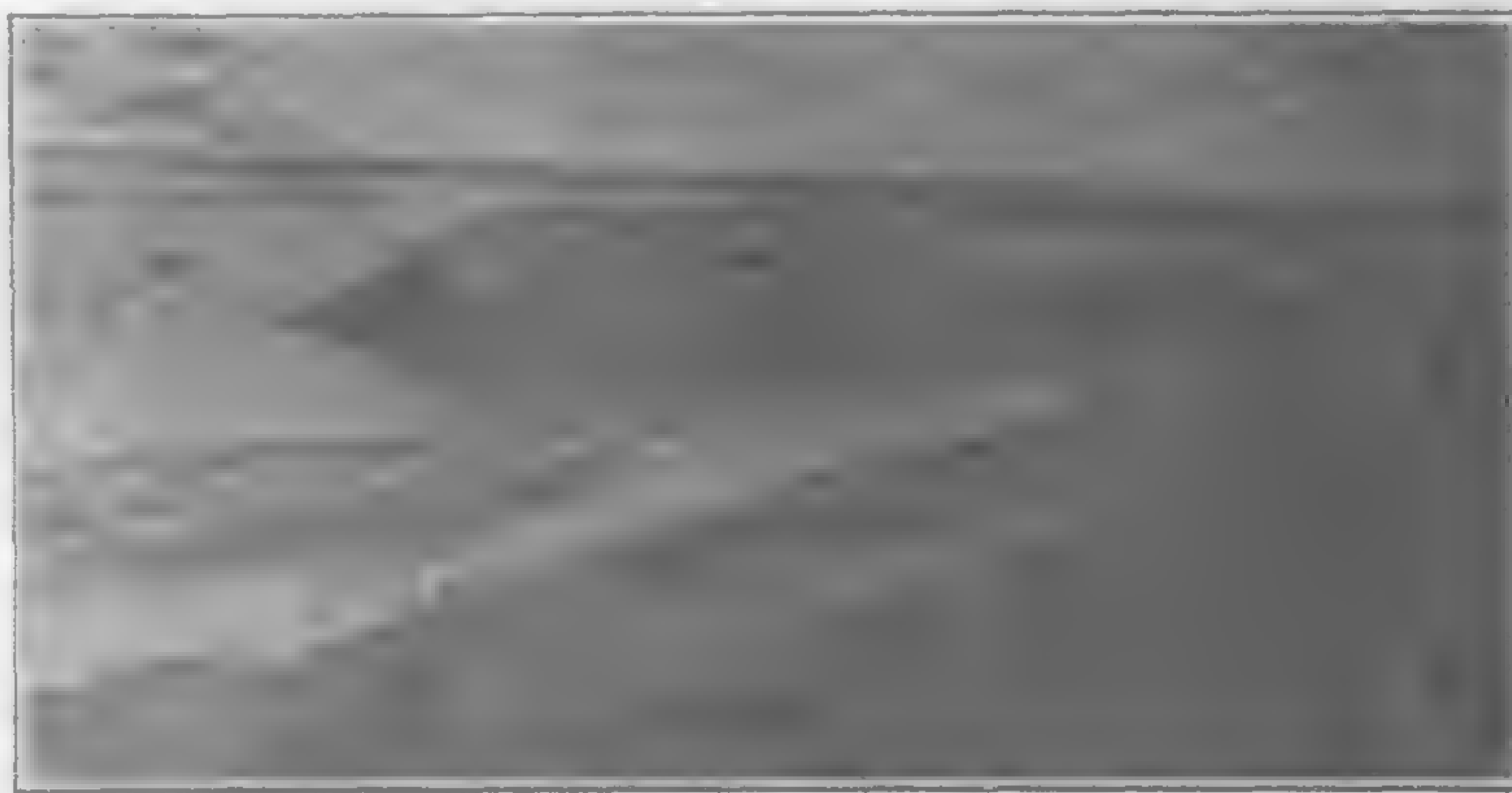
Levees along sand banks, where earth is scarce, are generally built with a sand core with earth facing on both sides. This method is adopted chiefly due to the difficulty and high cost of getting earth from a distance. When such practice is resorted to, the levee should be built with the greatest care so that the sand is properly weighed down with good earth both sides.

It is absolutely essential to use good earth in the construction of all important levees, even if the earth has to be transported from a distance. The first cost of the levee may be high, but it is a good

insurance of safety against possible catastrophe. When good earth can be obtained from both sides of the river, it is better to obtain all the necessary earth from the river-side of the levee, starting the excavation at least a hundred feet from the toe of the levee and sloping the excavated land towards the river. If earth on the river-side is insufficient, it may be obtained from the land-side. Before starting work on the levee, the ground should be first prepared by



Animal about size of an ordinary dog, very common at Tsien Chia-wan, which bores into and lives inside the levee



Effect of "false point" (chee tow) at Sze Tze-kow near Anlu: looking up stream

clearing off all old logs and stumps. Sometimes, the ground is covered with a scum and full of cracks due to the shrinkage of the mud brought up by the river. When such condition exists, the scum or the top layer of earth must be first removed and the ground excavated down to the bottom of the cracks. The foundation must be tamped hard before the first layer of earth is placed. The earth is placed in layers usually about a foot thick and each layer is tamped hard before the next layer is placed. Some engineers recommend that a ditch, the "muck ditch" about five feet deep and about five feet wide, should be dug along the centre line of the levee and built up again with good earth. The purpose of the ditch is to ascertain whether there is any logs or tree stumps or other rottable matters in the foundation. Although this is not quite necessary, it is a good practice. If the site should show any suspicion as to the presence of logs or rottable matters, this precaution should certainly be taken. If a "muck ditch" is dug, it should be again filled with good earth in layers and tamped hard as in levee construction.

The river-side of the levee should always be protected by sodding or facing with rocks. This is to prevent any possible erosion during the high water stage and sloughing due to heavy rain during the low water stage. Rock facing is very expensive. Sodding with good grass is almost an effective protection, unless the levee is located near the river bank and along the concave side of the river. In such case, rock facing should be used. There is a popular opinion that trees planted on a levee offer a sort of protection with their roots holding the soil together. Only to a certain extent this is true. But the slight beneficial effect is entirely obliterated by the possible danger which they may cause. During high water season, the levee is more or less saturated and the earth of the levee is softened. Any high wind during the high water season may easily blow down the trees with their roots thereby endangering the safety of the levee.

Although there are inspectors paid by the government, under the control of the Hupeh conservancy bureau, and stationed at different sections of the levee along the Han river, the duties of both the conservancy bureau and the inspectors have been so neglected that there is practically no central control. On account of this negligence in duty, these inspectors have practically no definite responsibility. Besides drawing their monthly wages, they do not seem to have anything to do. Moreover, the presence of some of these inspectors is sometimes a source of danger. Some of these inspectors are treacherous characters. Living constantly in an idle state, they are ever looking forward for a break in some part of the levee. A break of the levee is a god-sent chance to them. I was told that some of the most treacherous characters even would go so far as to cause a break by some underhand scheme. This necessitates work; and work, of course, means extra money, irrespective as to whether it is rightfully or wrongfully gained. I do not by any means desire to condemn all the officers and inspectors who are connected with the levee works. Many of them are absolutely conscientious and honorable characters. I have come in contact with several men, in connection with my works on the Han, who gave their whole time gratis or at a very low salary to superintend levee repair and construction with absolutely no other motive than philanthropic.

It is a pity that it seems to be the characteristics of the Chinese people in general to neglect the maintenance of any structure after it is constructed. The maintenance or rather the lack of maintenance of the levees of the Han river is a good example. After the levee is constructed, no thought is given to its maintenance until the structure deteriorates into such a condition so as to endanger the safety of the whole structure itself before any attention is given to it. Sometime they even have the patience to wait until the total failure of the structure before anything is done to it. They are then forced by circumstances to replace the entire structure with a new one after much damage is done by its failure.

Besides the total lack of maintenance, there are many abuses which I have noticed along the different sections of the levees. These abuses are: cultivation along the slope of the levee, excavat-

ing earth from the slope of the levee to add to its height, rooting grass for fuel on the slope of the levee by the poor farmers, burrowing holes into the levee by hogs and other animals. The last is not abuse by human hand. But since it is not being looked after by the inspectors, it may be termed so indirectly. All these abuses tend to loosen the soil of the levee thereby increasing the chances of sloughing, saturation and even failure.

As a suggested scheme for the maintenance of the levee system, I offer this plan. All the levees should be placed under the government control, and the work divided into sections. Each section is to be placed under the responsible charge of an officer to be known as the district officer or engineer. All these district officers are held responsible to a central office located at Hankow or Wuchang, under the charge of a chief officer or engineer. It goes without saying that this chief officer must be an experienced and conscientious engineer. A gang of proper size is stationed at each section to take of all repairs during the low water season. During the high water season, a very strict watch should be kept on the behavior of the levee and the gangs should be held ever ready to cope with any possible emergency. It should be the duty of each district officer to patrol his district at least once a day. The duty of these section gangs, besides keeping the levee in repair, is to watch the levee from all possible abuses. A proper scheme for the finance of levee repair and maintenance is not difficult. I understand that there is a steady revenue which amounts to no small figures from various *likin* stations annually specially devoted to this purpose. But this fund has always been misappropriated. Besides, I was also informed that there is an annual conservancy tax paid in to the government regularly by the different districts in the Han river valley, and this fund is supposedly devoted to levee repairs and construction. This fund, I understand, also amounts to no small figures. The difficulty seems to lie not on the finance itself but rather in its proper appropriation.

Levees may fail through three sources: (1) Overtopped by flood water; (2) sloughing; (3) flow through a crevice developed the levee.

Failure due to the first cause is very uncommon. Levees are generally constructed with sufficient height to take care of ordinary high water. But cases have happened every hundred years or so when certain sections of levees have been overtopped by abnormal flood. When a levee is overtopped by flood water, it takes but very little time for the inrush of water to develop a gap which soon enlarges sometimes to a length of two or three miles. With a proper maintenance gang, catastrophe due to this cause may be avoided by the careful watch and quick action of the gang. When the water comes to within a dangerous height of the levee, a fortress of sandbags should be placed immediately on top the embankment. These sandbags raise the height of the levee and sometimes are quite effective in averting a disaster. This necessitates the keeping on hand of a good stock of sandbags at all important sections of the levee.

Sloughing is due primarily to seepage through the body of the levee. All levees are built with earth and are therefore not absolutely impervious. They all seep more or less, and the amount of seepage depends upon the cross section of the levee, the quality of materials with which the levee is built, and the solidity of construction.

During high water stage, the earth of the levee is more or less saturated and the line of saturation dips downwards from the high water level on the river-side towards the toe of the levee on the land-side. If the cross section is too small, combined with poor materials or improper construction or both, seepage may develop. Such seepage tends to develop sloughs on the land-side of the levee. When any seepage is developed and the seepage water is not properly drained off immediately, the water flowing through the sloughs will bring along with it, earth from the levee, thereby endangering its safety. When a levee begins to seep, the seepage water should be drained off immediately to prevent sloughing. A very effective method which had been very successfully used on the Mississippi, is to cover the whole seepage area with a layer of brushwood, care-

fully weighed down with rocks. Care should be taken in not using too much rocks to overweigh the brushwood. The chief idea of the brushwood is not to try to force the seepage water to flow through it but rather to let the water to flow under it, and the brushwood acts as a sort of impediment to retain or hold back the earth which tends to flow with the water.

Sometimes the seepage water develops into a little stream, bringing along with it, sand and clay from the interior of the levee. When such condition occurs, it should be looked after more carefully. This method has been successfully used in some localities of the Mississippi river, is to build a pond around the seep hole on the land-side of the levee with sandbags, not allowing the water to flow down the slope. The water collected in this pond develops a back hydraulic pressure and may stop the flow. But the ingress must be located. Sandbags, and earth if the current is not too strong, must be thrown into the water at the locality of the ingress to try to stop the water from flowing. Large seepage holes may develop into a crevice.

Crevice may be developed in the levee by the enlargement of seepage holes, logs or other matters rotted in the levee. The only possible method in trying to stop the flow of water through a crevice after it is developed is by the method just described in the last paragraph. But this even seldom attain any success. Many engineers recommend that after the water had gained a certain headway, in the crevice, no attempt should be made to close it, as such attempt invariably proves to be futile.

In connection with levee failures, due to crevice, it is interesting to cite an incident which happened on the levee failure at Tsien Chia Wan, a village about thirty li below Sha Yang, during the flood of 1921. A farmer just behind the levee, desiring to have some water for his crop, dug a little channel on top the levee. He expected to draw just sufficient water from the river through this channel and then dam it back again. But unfortunately, the water rose on him suddenly and soon got beyond his control. The channel begun to widen rapidly, and, within a few hours, the whole levee gave away, developing a break of about a thousand feet long.

Macao's Big Harbor Improvement Scheme

Dutch Firm Secures the Contract

A BEGINNING is about to be made with the long-discussed harbor project at Macao. According to the "Hongkong Daily Press" a considerable portion of the work is to be put in hand within the next few months, the tender of the Netherlands Harbor Works Co. having just been accepted, at roughly six-and-a-half million dollars, subject to certain conditions and reservations with respect to unforeseen circumstances that may arise, e.g., typhoon damage during the progress of the work.

Three great firms were in the running for this important contract: Sir Whitworth Armstrong, Ltd., Newcastle; the Pacific Construction Co., Vancouver, B.C.; and the Netherlands Harbor Works Co., Amsterdam, whose agents are the Holland-China Trading Co. Tenders were to be sent in by April 18 of this year, but at the request of one of the tenderers an extension of a month was granted and finally another extension to June 20. On that day two tenders were handed in at Macao to the Jury. The Pacific Construction Co., notified that they could not submit full specifications in the time.

The Dutch Tender

The tender of the Netherlands Harbor Works Company has been found the more advantageous of the two, and terms were finally arranged between the Macao government and Mr. Van Exter, the Company's representative. Certain reservations are made in respect of circumstances beyond the control of the contractors. These problems will be dealt with as and when they arise and it may be that, if unforeseen difficulties are unexpectedly numerous, the scheme will be modified in some respects in order to keep within the sum of seven million dollars or so that the Macao government has in hand for this work.

The Netherlands Harbor Works Co. completed in 1921 the Chefoo Harbor Works improvement scheme at a cost of four-and-a-half million dollars. Besides bringing to Macao from Chefoo the extensive plant used there, the Company will bring from Europe a number of powerful dredgers and towboats, in order to expedite the work as much as possible. Operations will begin in about four months' time and it is estimated that the work will occupy three years.

The most recent proposals for the Macao harbor improvements were estimated to cost between \$15,000,000 and \$20,000,000. It was proposed to make extensive reclamations in front of the Praya Grande and in the junk harbor near the Green Island Cement Works: also to cut a canal connecting the inner harbor with the Canton river and a channel to deep water and to construct an "artificial port" by building two sea walls and a breakwater.

The scheme now to be carried out comprises a reclamation extending approximately from the corner of the Praya Grande, known as the San Francisco Battery, to point known as Macao Siak. On this reclamation, ultimately, offices and godowns will be built. Projecting from the reclamation, the contractors are required to build two sea walls and a breakwater enclosing a water area partly dredged to 21 feet l.w.s. (low-water at spring tides). It will also be possible to build out piers from the inner side of the walls and so give further facilities for handling cargo from this "artificial port," as it is called, the contract provides that a channel is to be dredged to the deep water channel—a distance of approximately three miles. The channel will be about 100 feet wide at the bottom, and 21 feet deep. The Macao government's estimate of the cost of the reclamation, the "artificial port" and the three mile channel was about four-and-a-half million dollars, but the lowest tender—that of the Netherlands Co.—was higher than that sum by two million dollars.

The plans of the work, on which the tenderers prepared their estimates, were prepared by Admiral Hugo de Lacerda, the director of the port of Macao, who has been working on the project for several years. Admiral de Lacerda planned and superintended the important harbor works at Laurengo Marques.

The Imperial Steel Works at Yawata, Japan, has completed construction of its plant for making tin plate. This plant was erected with a view to checking imports of tin plate from America. Its estimated annual capacity is 20,000 tons, although, Commercial Attaché James F. Abbott reports from Tokyo, the first year's production is not expected to exceed 6,000 tons.



A Packard Twin-Six at a Wayside Temple in Japan

The Passenger Car Market in Japan

Interview with Mr. William I. Irvine, U.S. Trade Commissioner

WR. WILLIAM I. IRVINE, the automotive expert of the U.S. department of commerce, has completed an exhaustive survey of the Japanese and Chinese markets for automobiles and trucks. Portions of his comprehensive report have been released and published in many American newspapers attracting unusual attention for the mass of new and accurate detailed information which has enabled American manufacturers to gather an intelligent idea of the needs and possibilities of this promising market. Of special interest and trade value are his findings on the present and future possibilities of the passenger car market in Japan where it was expected that with the recovery of European industry after the war that an attempt would be made by the automotive manufacturers to re-enter the markets in which their cars had met with favor in the past. "Many predictions were made," says Mr. Irvine, "that the hold which America had secured on the Japanese market would be seriously weakened as the Japanese had a decided preference for European cars and only bought American vehicles of necessity. These predictions have fallen far short of realization as yet. The losses which American cars have sustained have only to a small degree been the result of vigorous competition the gains by European manufacturers have been due to the fortuitous circumstance of a tax levy which operates against American cars. And as to whether these gains will continue there is doubt even in the minds of the sellers of European vehicles. In numbers of cars imported into Japan, America has always led and but once has taken second place in value and so in view of the wide familiarity it is safe to make the prediction that American cars will always hold first place, providing manufacturers cultivate the market. In this opinion the majority of Japanese dealers concur.

"The relative importance of the contenders for the Japanese market are shown by the following table of imports of motor cars

published in the 'Annual Return of the Foreign Trade of the Empire of Japan.' Values given are in Yen (1 yen=.4985).

Countries		United States	Great Britain	France	Italy	Germany	Others
Year Number and Value							
1912*	Value	505,377	218,697	42,566	57,166	62,436	6,704
1913*	Value	487,325	257,098	64,670	108,409	187,381	—
1914	Number	37	20	2	15	17	3
"	Value	60,297	64,059	8,765	56,977	40,223	10,289
1915	Number	22	5	1	2	—	—
"	Value	30,481	19,910	3,096	9,100	—	—
1916	Number	196	12	1	6	3	—
"	Value	320,941	28,052	800	33,904	3,100	—
1917	Number	851	3	1	—	—	5
"	Value	1,548,804	12,077	500	—	—	7,449
1918	Number	1,636	1	1	13	—	1
"	Value	4,426,938	2,500	2,000	91,935	—	1,400
1919	Number	1,520	2	—	—	17	38
"	Value	5,275,000	23,000	—	—	123,000	108,000
1920	Number	1,684	27	14	4	1	15
"	Value	4,608,000	142,000	53,000	26,000	3,000	32,000
1921	Number	832	75	83	46	22	15
"	Value	2,160,638	476,480	353,432	160,645	32,000	88,160

*Parts included.

"Cars and trucks are jointly classified in the Japanese customs returns so that to get a true picture of the number of cars imported from America the following allowances for truck imports must be made: 1916, 10 per cent.; 1917, 10 per cent.; 1918, 22 per cent.; 1919, 40 per cent.; 1920, 44 per cent. These percentages are derived from published figures of the numbers of cars and trucks exported from the United States to Japan. No allowance need be made for trucks from any of the other figures as practically all trucks in Japan are of American origin.

"But the true picture of the market cannot be gained without taking into consideration the imports of spare parts, for under this



Mercer Touring Cars used by the Japanese Army outside the War Office, Tokyo



The Magnificent Rolls-Royce Car Ordered from Sale and Frazar by the Imperial Household Department for the use of H. R. H. The Prince of Wales



Packard Car bought by the Osaka Municipality for the use of H.R.H. The Prince of Wales

heading are entered hundreds of disassembled cars and trucks. The following figures of the imports of motor parts from 1914 to 1921 are from the same source. Values are in yen :

Countries		United States	Great Britain	France	Italy	Germany	Others
Year							
1914 Value	...	140,496	31,962	30,945	31,822	23,745	503
1915 Value	...	37,263	13,710	11,945	24,738	5,237	26,234
1916 Value	...	380,705	18,820	9,362	17,388	—	416
1917 Value	...	1,084,009	—	11,000	—	—	—
1918 Value	...	3,134,000	—	1,000	—	—	—
1919 Value	...	5,568,000	—	22,000	155,000	—	4,000
1920 Value	...	5,453,000	83,000	35,000	12,000	7,000	18,000
1921 Value	...	4,037,376	438,150	139,481	87,827	44,631	34,061

“ A definite idea of the number of cars represented by the imports of parts may be gained by using the figures of Y.2,550 as the unit value per car. From this deduct 550 as the approximate



Largest Car in Japan: Isotta-Fraschini, 100 H.P.; 8 cylinders in line



Delage Touring Car, 4 wheel brakes, owned by Baron Shidehara

value of spare parts per car. The unit value is reached on the following calculation. The number of cars and trucks exported from the United States to Japan during 1920 was 4,029. The foregoing import tables show that the total value of cars and spare parts imported into Japan for the same period was Y.10,961,000. The division of the American number into Japanese value gives the approximate unit cost in yen, after the parts figures are reduced 6 per cent. to allow for tires which are included as spare parts. The figure of Y.550 is probably too high to use to show the value of spare parts imported for each

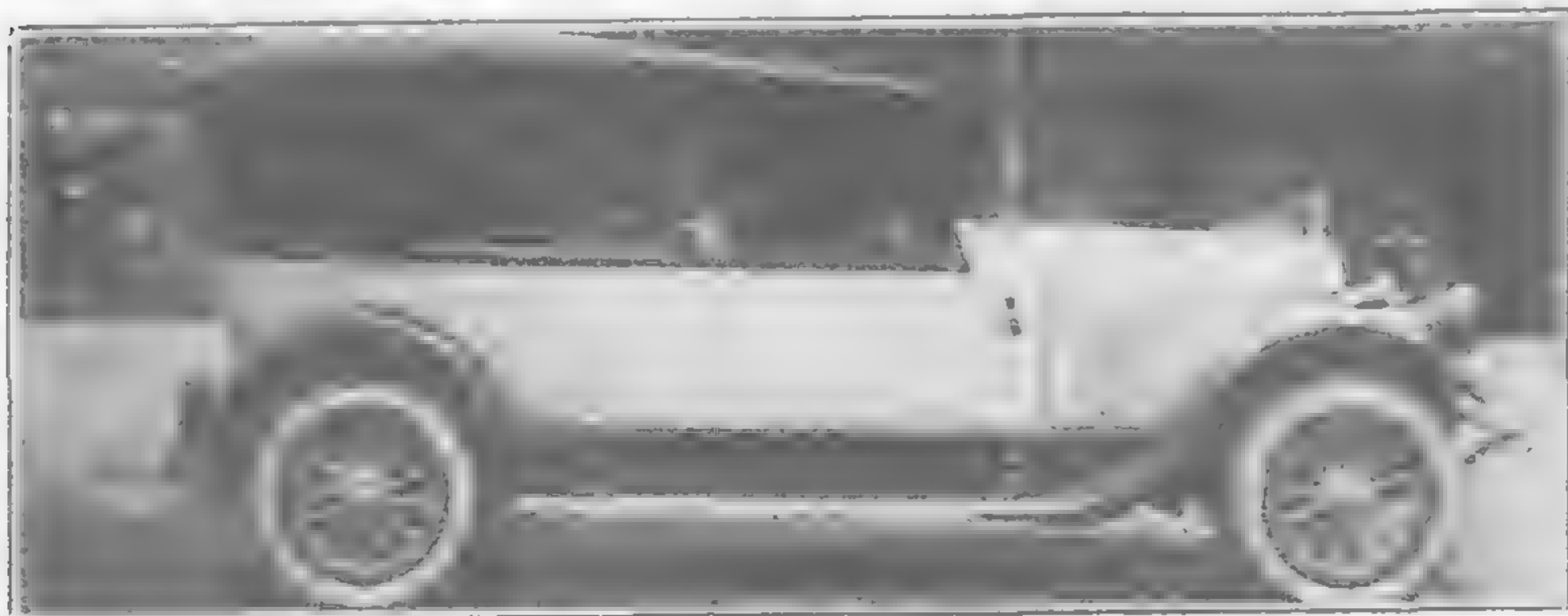


Harley Davidson with Rear Car Attached: Rear Car built at Nakano

market. Beginning in 1920 European manufacturers re-entered the field but it was not until 1921 when the new tax went into affect in Tokyo that a preceptable inroad was made. In 1920 American car imports were 95 per cent. in number and 93 per cent. in value and within a fraction of 100 per cent. of spare parts. These figures dropped during 1921 to 77 per cent. in number and 66 per cent. in value of cars and 84.5 per cent. of spare parts.

"Sources of Competition

"If the losses sustained in the value of cars and parts combined Great



New Pierce-Arrow (1922): Japan Automobile Company



Hudson Touring Car

car, but it is suggested in order to give a more conservative figure.

"A comparison of the values of complete vehicles with spare parts shows that since 1919, the value of the latter has exceeded the former. Thus more than one-half of American automotive vehicles are imported as spare parts which further proves that Japan is a greater chassis than a complete car market. The foregoing tables show that with but one exception America has lead in Japanese imports and that for the period from 1916 to 1921 it dominated absolutely the



Dodge Brothers Car with Japanese Body

Britain has gained a fraction less than 50 per cent. with France second and Italy third. In car numbers France leads Great Britain by eight. The relative position won by Great Britain will probably be held for its manufacturers are better represented than are either the French or Italian. The advantage which the Tokyo tax gives the small cylindrical dimensions cars has enabled British manufacturers with their light cars to establish themselves much more rapidly than they could have done had the past taxing policy been con-



Fiat Car: Sold by Japan Automobile Co.



Daimler Car: Sold by the Japan Automobile Co.

tinued. This is demonstrated in cities outside of Tokyo where the small light car has yet to make any definite impression upon the market. The general run of European light cars average 10 to 15 horse-power under the Tokyo system of rating while American cars as a whole are rated at over 20. One American car which sells in the United States for less than \$1,000 falls into the same tax class as the British Rolls-Royce, a perfect illustration of the inequality of the tax.

"Although as a group British manufacturers lead in competition against American, no single manufacturer has made a decided impression on the market. A few cars of each make have been imported but in the whole field the individual is lost sight of. It remains for an Italian car—Fiat—to head the list of European competitors of American cars. The small Model 501 has made a very favorable impression and has the good fortune to be in the hands of one of the soundest Japanese dealers with an organization not limited to Tokyo. This car falls into the 5 to 10 horse-power class and is reported to give 23 miles to the gallon of gasoline. Equipped with a 4-seated touring body it is quoted at Y.7,000 (\$3,500), but it is alleged that there is no fixed price and that sales have been made well above and below this figure. Second in importance in number sold is the French Model Renault, 10 horse-power, followed by the Citron, also French, rated under 10 horse-power. The former with open 4 seat body is quoted at Y.7,500 (\$3,750) while the latter is said to sell for Y.6,000 (\$3,000). Other light cars which are being sold are the British Bean, 9.83 horse-power, closed body, Y.7,000 (\$3,500): Wolseley, 10 horse-power, 4 seat, open body, Y.6,000 to Y.7,000 (\$3,000 to \$3,500): Mathis which is a French cycle car, selling for about \$2,500. The following are represented and a few of each have been sold: DeDion

(French), Humber (British), Bianca (Italian), Austin (British), Standard (British), and Rover (British).

"The Advantages and Disadvantages of the Light Car

"The principal points in favor of light cars are small horse-power rating which gives it the advantage of a lower tax, economical gasoline consumption, long tire mileage and low mechanical maintenance costs. These are the arguments used in advertisements. Against this as counter claims are the comparatively high prices and the fact that these cars are not built to meet the severe operating conditions of Japan, which has been discovered by some of the first

buyers of this type of car. The cars are designed primarily for use in the countries of their origin where there are excellent motor roads. The roads in Japan and especially in the streets of Tokyo are very different from European highways and it is doubtful if the cars will stand up for long. The opinion was expressed by an American service man who has had an opportunity to examine some cars after considerable use that in most of the small cars the rear springing, rear axle construction, and method of taking the power from the transmission shaft are inadequate for Japanese

operating conditions. This opinion is borne out with several cars which have practically been dropped by their distributors because of the constant complaint of owners.

"Operating against the continued popularity of this type is the fact that open cars are not popular in Japan for the following reasons: owners will not ride in the same body with the chauffeur; the frequency of rains and the clouds of dust on dry days. (In passing it may be noted that the soil is very porous in Japan and only by constant sprinkling can the dust clouds be reduced. It is a common sight to see streets being sprinkled twenty four-hours



Rolls-Royce owned by Mr. E. H. Hunter

operating conditions. This opinion is borne out with several cars which have practically been dropped by their distributors because of the constant complaint of owners.



Citroën Torpedo, special de luxe, sold to Mr. P. Claudel, the French Ambassador



5 hp. Citroën—Two Seater

after rain). These conditions compel the use of an enclosed body. The European light cars are primarily designed as two-seat roadsters but this has not prevented their Japanese distributors from fitting them with heavy limousine bodies. It is questionable if these light cars can perform satisfactory for any length of time under constant overload. Unless these cars can be equipped with limousine bodies they cannot hold in the market. Motor cars are primarily designed for social purposes and protection must be given

to gala costume and the uncovered heads of women for Japanese ladies never wear hats. The light construction of the car and the heavy bodies do not make for comfort. Dealers admit that complaints have been made that the cars jolt so badly that the elaborate coiffure of the ladies and high hats of the men have been ruined by coming

in sharp contact with car roofs. It is not patriotism so felt that causes Americans in Tokyo to call first on the company that operates American cars in its taxi service when in need of cars.

"Speed claims are made for all these light cars running anywhere from 35 to 50 miles an hour, but the opportunity to test them is rarely afforded because road conditions do not encourage touring. The advantages which American cars enjoy of acceleration and hill-climbing ability is not fully appreciated due to the absence of the owner-driver class. Chauffeurs do not appear to mind gear changing frequently but there is beginning to be complaints about the poor hill-climbing ability of the light cars and owners are noticing this. The average Japanese has considerable vanity and dealers have said that owners are not pleased when a car passes them on hills without difficulty.

"The *pros* and *cons* of the situation are being studied and not a few dealers are willing to predict that the popularity of light cars may be short lived, especially when economic conditions improve. The present business situation is such that the matter of taxes and operating costs receive disproportional consideration which will not continue with the return of prosperity, for the average owner in Japan is comparatively wealthy.

"Competition of High Price Cars

"The tax question has but slight bearing on cars that sell in Japan for \$5,000 or over. The principal aid to the sale of European cars in this class is the belief entertained by many that European cars are superior to American. The majority of the European quality cars fall in the 15-20 horse-power group, but it is doubtful if buyers give much heed to this fact for practically every high-class car carries two men. The majority of these cars are represented by small dealers or by firms that are associated in other lines with British interests. European car agents are very enthusiastic about the cars they are receiving as compared with the rather apathetic attitude of the distributors of cars of similar class of American origin. The only reason which the latter offers for the frequency of European car sales is the prejudice which the Japanese have for things European and the fact that the imperial household department which buys about one-fourth of all quality cars has set an example which Japanese, very loyal to the throne, are following. It is doubtful if many of the recent buyers have purchased because they really decided between the mechanical qualifications and superiority of European and American cars. On the other hand the growing popularity of

European quality cars may be due to the lack of attention which American manufacturers of high price cars give to the overseas market. Several high-grade cars are very poorly represented in Japan while the dealers of others seem to lack conviction regarding the merits of the cars in their charge. It appears as though American manufacturers may do some profitable educational work among their distributors.

"The European cars of this class are Rolls-Royce, Crossley

Armstrong-Sidley, Daimler, Sunbeam, Vauxhall, all British: Renault, Delage, French: Fiat, Lancia, Isotta, Italian: Opel, Protus, German and the Austrian Daimler. Of these the best sellers are the British Daimler and the Renault followed by Fiat. With the exception of the Renault 12-18 model which sells for Y.12,000



Paige and Dela Haye Cars Exhibited at the Tokyo Pleace Exhibition by the Naigai Automobile Co., Ltd.

(\$6,000), the Model 505 Fiat, 15 horse-power which sells for Y.10,500 (\$5,250) and the German cars which fluctuate almost from week to week from Y.9,000 (\$4,500) to Y.12,000 (\$6,000), the quality cars sell from Y.15,000 (\$7,500) to Y.20,000 (\$10,000.) The British Daimler is probably the most popular of the European cars.

"Dealers Attitude to European Cars

"In nearly every instance when dealers were asked why they had taken up European cars, especially the light models which sell at a higher average price than the average American, they replied that it was a matter of self-defense, necessary if they were to keep their organizations together. They maintained that they had to have something to sell and that the tax had practically cut the American business to less than one-half. Some declared that they did not want to handle European cars preferring to have all-American lines as it was confusing to do business with several nations because of the different methods employed and stated that if the taxes were considerably lessened they would discontinue their European light car connections for American cars were cheaper and when they could buy them at the reduced prices it would be difficult to sell European cars.

"It must be borne in mind that of the stock of about 750 cars unsold in Japan to which reference was made in the report on current business conditions in Japan as of April 4, 1922, that fully 80 per cent. were bought at the prevailing high prices of 1920. Not until these are disposed off will the disparity between European and American prices be fully shown.

"Summed up it would appear that American manufacturers as a whole have a fine opportunity to continue to dominate in the Japanese market as the success of European manufacturers rests on a rather insecure basis.

"Types of Cars Preferred

"Japanese owners and prospective buyers are not mechanically minded so the Japanese field is free of discussions of technical qualities which often influence sales. Dealers rarely discuss the mechanical features except to express hope that American cars of the future may be designed to allow for greater economy of operation. Occasionally a man will talk of shorter wheel base and narrower tread only to contradict himself by talking of roomy bodies as requisite to Japanese requirements. There has been no crystallization of opinion of four and six cylinder cars or types of higher

multiple. Every design, even up to the straight-eight, is on the market so that it may be said that any standard car can be sold in Japan, provided it is backed by an energetic selling organization.

"It has been shown by the import statistics the market demand is primarily for chassis. Complete cars entered are special limousine jobs and touring cars. Japanese body builders have been compelled to specialize on the limousine because of the decided preference for this type. So universal is the demand that builders carry a few in finished bodies on hand, leaving the upholstering and general luxury touches to be settled by the buyer. Nearly all Japanese limousines provide for at least five people and sometimes six. A frequent sight in the country is a very popular low price American car equipped with a limousine body with three extra folding seats. Coupé and sedan styles are a drug on the market as several dealers have learned to their costs. One has ten coupés on hand and has been unable to sell any during the past year. Manufacturers first entering the market or dealing with a new agency should hesitate about sending any body types other than limousine or touring. There is a very small demand for roadsters to meet the requirements of foreigners or the small amount of Japanese who are beginning to drive their own cars. The influence of women in car sales may almost entirely be discounted, hence features which appeal to women in America such as easy driving or special comfort count for practically nothing. Due to the narrow streets, short wheel base cars will always have a decided advantage.

"Standard equipment on cars should include magnetos otherwise dealers must supply them at a cost in excess of what the American manufacturer could. In this connection it must be borne in mind that when a Japanese buys a car he holds the opinion that every part is made by the car maker and so if anything goes wrong with a piece of equipment he blames the car, therefore, it is good policy to equip with standard magnetos rather than allow the dealer to equip with one of poor quality which will reflect on the car. The selling price also includes mud splash guards, spare tire, bulb horn, electric horn and an electric light in the rear roof of the car. The law requires the rear seats to be under lights, so that even touring bodies must be so equipped. Nickel plated parts do not wear well owing to climatic conditions for which reason there is a preference for brass.

"Selling Terms

"Selling on the instalment basis appears to be somewhat disgraceful as all dealers state that they do not do so, while their competitors charge them with the practice, especially at this time when it is very difficult to sell. It is said by nearly all that competition is such that there are six cars on hand for every buyer and so in order to make a sale unusual terms are offered. Under normal conditions it is probable that time payments are not granted, except on the basis of 50 per cent. on taking over the car and the balance within three months. Under Japanese law it is very difficult to recover and re-possession by law is seldom sought. The first thing a dealer does when he gets a live prospect is to make a careful investigation of his bank balance and to make inquiry of his family connections. If these prove satisfactory he may take a three months risk. But the general idea of deferred payments has not taken hold as the class of car owners generally have enough money to pay outright for a car. There are no working-men owners. Car ownership implies a chauffeur and a private garage which in turn means house ownership in a section where streets are wide enough to permit the passage of a car. As a rule Japanese houses are built very close together and the majority are approached through narrow streets, or, what we would term alleys in America. Few houses have basements so that the space required for a garage is almost equal to one-half the size of a house lot, and land is very expensive. In the country districts the farmers are, as a class, too poor to own cars, the sale being limited to the merchant class. The bicycle is still the pleasure vehicle of the masses of people and they are seen in countless numbers in almost every part of Japan. The best selling season is March, April and May, and a short fall season from September 15th to November 1st."

Nobel Industries at the Brazilian Exhibition

ONE of the principal exhibitors at the Brazilian centenary exhibition 1922, will be Nobel Industries, Ltd., who have supported the department of overseas trade in this project from its inception.

Nobel Industries, Ltd., was formed in 1918 and comprises many important British undertakings engaged in the manufacture of explosives and allied products. The interests of the companies have been extended during the post-war reconstruction period and now cover many industries other than explosives.

Their stand will be located in the north side of the western annexe of the British section and the exhibits will be of such a varied and interesting nature that we give them some detail. The whole will be contained in one large showcase.

Generally speaking, the samples of Nobel products are exhibited under four heads: Explosives—Ammunition—Metal Goods—Miscellaneous.

Explosives.—These consist of dummy blasting cartridges illustrating the cartridges generally in use in South America manufactured by Nobel's Explosives Company Ltd. (Glasgow) and Curtis's & Harvey, Ltd., such as gelatine dynamite, gelignite, dynamite—raw materials such as cotton, woodmeal, guhr and nitrate of lead—dummy samples of nitroglycerine, nitric and sulphuric acids, etc. — Detonators and electric detonators, fuse made by Nobel's Explosives Company, Ltd., Bickford Smith & Company, Ltd. and W. Bennett Sons & Company, Ltd., igniters, exploders, cards showing different stages in the manufacture of detonators and detonators connected up with blasting cartridges.

Ammunition.—Under this heading are shown dummy samples of shot-gun, rifle and revolver cartridges made by Eloy Brothers, Ltd. and Kynoch, Ltd., who manufacture in their factories cartridges for any known form of weapon, British or foreign. In addition, sporting powders are exhibited and include such well-known brands as Curtis's and Harvey's "Smokeless Diamond," "E.C.," "Schultze" and Ballistite" and various kinds of black powders.

Metal Goods.—This comprises a big variety of exhibits; wire, sheet and strip in copper, brass and other non-ferrous metals made by Kynoch, Ltd., at Birmingham; semi-manufactured articles such as components for motor accessories; complete samples such as tubes, cycle parts and brakes, rustless "Roman rims," stoves and petrol lamps and shaving stick cases.

Other interesting exhibits are carbon-free metals, thermit welding including a section of tramrail "Thermit-Welded," and metal powders of various shades.

Miscellaneous.—This embraces a wide range of goods and includes art leather cloth, soft and Collodionised incandescent mantles and vapour lamps, "Necol" Collodion products and the "Lightning" fastener.

The finished article showing art leather cloth such as blotters, cigarette cases, photograph frames, children's shoes, etc., indicate the practical and varied applications of this material as manufactured by the British Pluviusin Company (1920), Ltd., at Manchester. This cloth is very largely used for upholstering motor-cars and railway carriages.

The incandescent mantle exhibits are manufactured by Curtis's & Harvey, Ltd. (Proprietors Lighting Trades, Ltd.) in London and include "Ironclad" brand and soft mantles for use with vapour lamps and lanterns. Attention is drawn to the "Evening Star" lamp which is both effective and handsome.

Amongst the Collodion exhibits made in England by Necol Industrial Collodions Ltd., are "Necol" household cement which is waterproof and unaffected by heat and mends anything, and "Necol" plastic wood, extremely useful to pattern-makers and woodworkers, being a mouldable substance which hardens on exposure to the air.

The "Lightning" fastener is a new, quick and efficient fastener made in nickel silver for fancy leather and sports goods and clothing. The samples displayed indicate some of the applications of this clever device.

Tokyo's New Hotel

THE new Imperial Hotel was opened on July 2, 1922, to accommodate the party of Secretary Denby. Although the building is but half completed, the main rooms are now open to the public, and an increasing number of guests attracted by the unusual interest of its architecture and unique fitting, is daily passing through its corridors.

Many criticisms, just and unjust, have been made of the architectural features of the hotel, but little fault can be found with the elegance of its appointments.

There are 250 rooms, many of them *en suite*, all with baths. The principal banquet hall will seat 1,000 people, while there are 10 small banquet rooms where another 1,000 people can be accommodated. The main

dining room seats 400 people, and the grill room 250. A concert hall not yet completed will seat 1,100 people, and will be equipped with a stage on which dramatic performances can be given as well as in any theatre in Japan.

A swimming pool 25 by 60 feet is to be equipped with the latest light purifiers, which have been ordered from the United States. The barber shop has the latest sanitary appointments. The laundry equipment is all electrically operated, and all heating and cooking in the hotel is done by electricity. The hotel purchases 1,500 kilowatts of power from the Tokyo city electric bureau to operate this equipment.

A post office is housed in the street level, and there is to be space for 46 shops each 12 by 18 feet on the same floor.



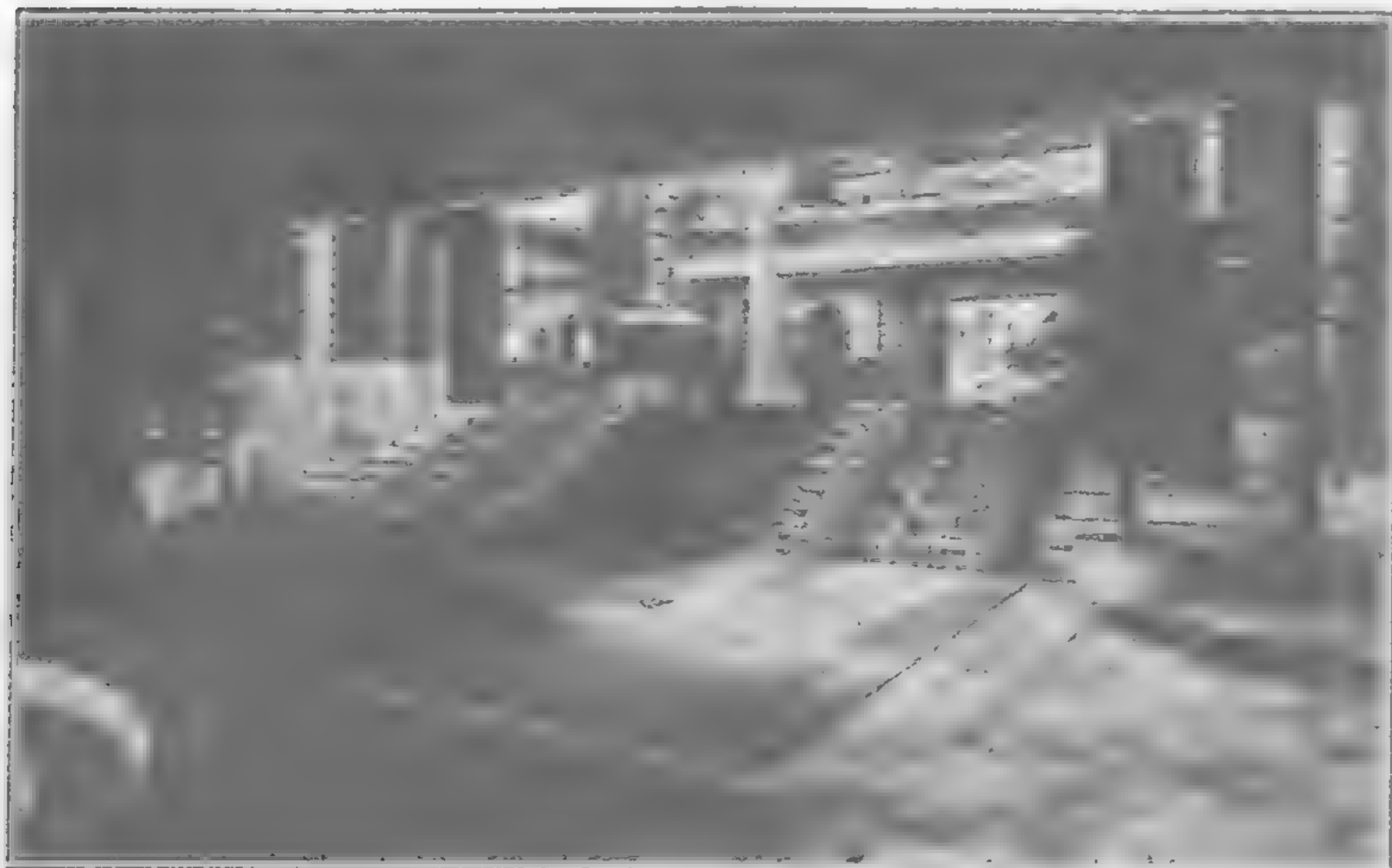
Main Entrance from Hibiya Park Side



"Peacock Alley"



Main Lobby



Entrance Hall



One of the many Verandahs

The total floor space of the hotel is 360,000 sq. ft. The furnishings of the hotel were built by the hotel carpenters. The rug were specially made in Tientsin, and are one of the greatest beauties of the hotel. Silver and cutlery were ordered in the United States, and the table china has been made in Japan. The upholstery was imported. There is a telephone in each room of the hotel.

The building is constructed of stone and brown brick. The brick was baked on special orders, and the stone is a peculiar soft leprous looking greeny-grey stone, quarried near Nikko, known in Japan as "Oya ishi."

The hotel is now under the management of Mr. H. S. K. Yamaguchi, of the Fujiya Hotel in Miyanoshita. The Imperial Hotel

Company, Ltd., is capitalized at Y.6,000,000, of which Y.3,750,000 is paid up. There are 120,000 shares issued of which 22,000 representing Y.1,100,000 are owned by the imperial household.

The officers of the company are:—

President: The Honorable K. Okura, Jr.

Managing Director: H. S. K. Yamaguchi, Esq.

Managing Director and Auditor: T. Kobayashi, Esq.

Directors: R. Asano, Esq., I. Wakao, Esq., Jr. and S. Kanaya, Esq.

Auditors: R. Wakao, Esq., and K. Koike, Esq.

Construction of the uncompleted part of the hotel will be finished in 1923.



View from the Roof



A Guest Room



Main Dining Room

Nitrogen Fixation in Japan

According to a Japanese correspondent at Osaka, Japan, the Suyuki Trading Company, of Kobe, one of the largest commercial concerns in that country, has decided to erect a factory at Hikoshima, near Shimonoseki, with a view to fixation of atmospheric nitrogen by the Claude process. Some three years ago, one of the company's engineering experts was sent to France to investigate the process, and on his return, arrangements were made to proceed with the scheme. Owing to the secrecy with which the plan was worked out, no intimation was given of the firm's intentions until quite recently. It is understood that the scheme is to be carried out on an extensive scale, even by way of trial; and according to a responsible member of the firm, the plant is estimated to produce 10 tons of nitrogen per day during the preliminary tests. When manufacture is commenced on a commercial scale, however, it is anticipated that the output will amount to as much as 1,000 tons per day. The sulphate of ammonia market in Japan is bound to be affected if this venture comes to full fruition.

New Bridge for Tientsin

An international bridge committee is working on estimates for the new international bridge over the Hai-ho, planned at the end of Rue de France and it is possible that public tenders will be requested in the near future.

At the invitation of the committee, a meeting of the representatives of the officials, municipalities and administrations interested in the new bridge project was held in the French municipality recently under the chairmanship of Mr. W. P. Ker, H.B.M.'s consul-general.

The meeting unanimously approved the committee's proposal to build the new bridge in continuation of the Rue de France, and advised that the width of the main road should be 40 feet, the width of the sidewalks 9 feet and that the river fairway between the piers of the bridge should be 140 feet.

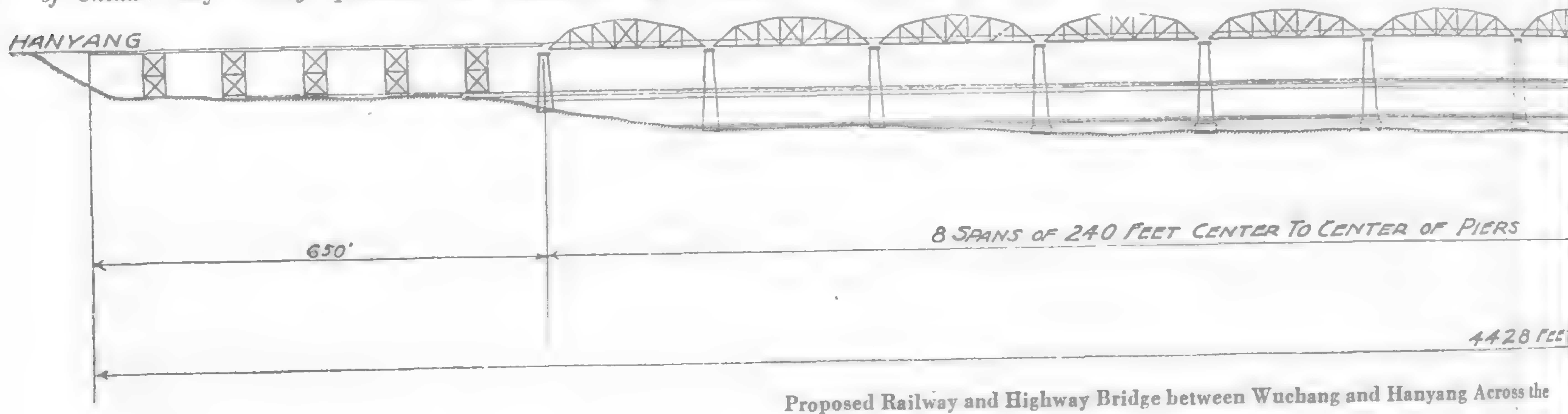
The Proposed Bridges Across the Yangtze and Han Rivers

Report upon a Project to Connect the Northern and the Southern Railroad Systems of China by Bridging the Yangtze and the Han Rivers near their Junction and to Provide Highway and Electric Railway Service between the Cities of Hankow, Han Yang and Wu Chang.

By Dr. J. A. L. Waddell, Consulting Engineer

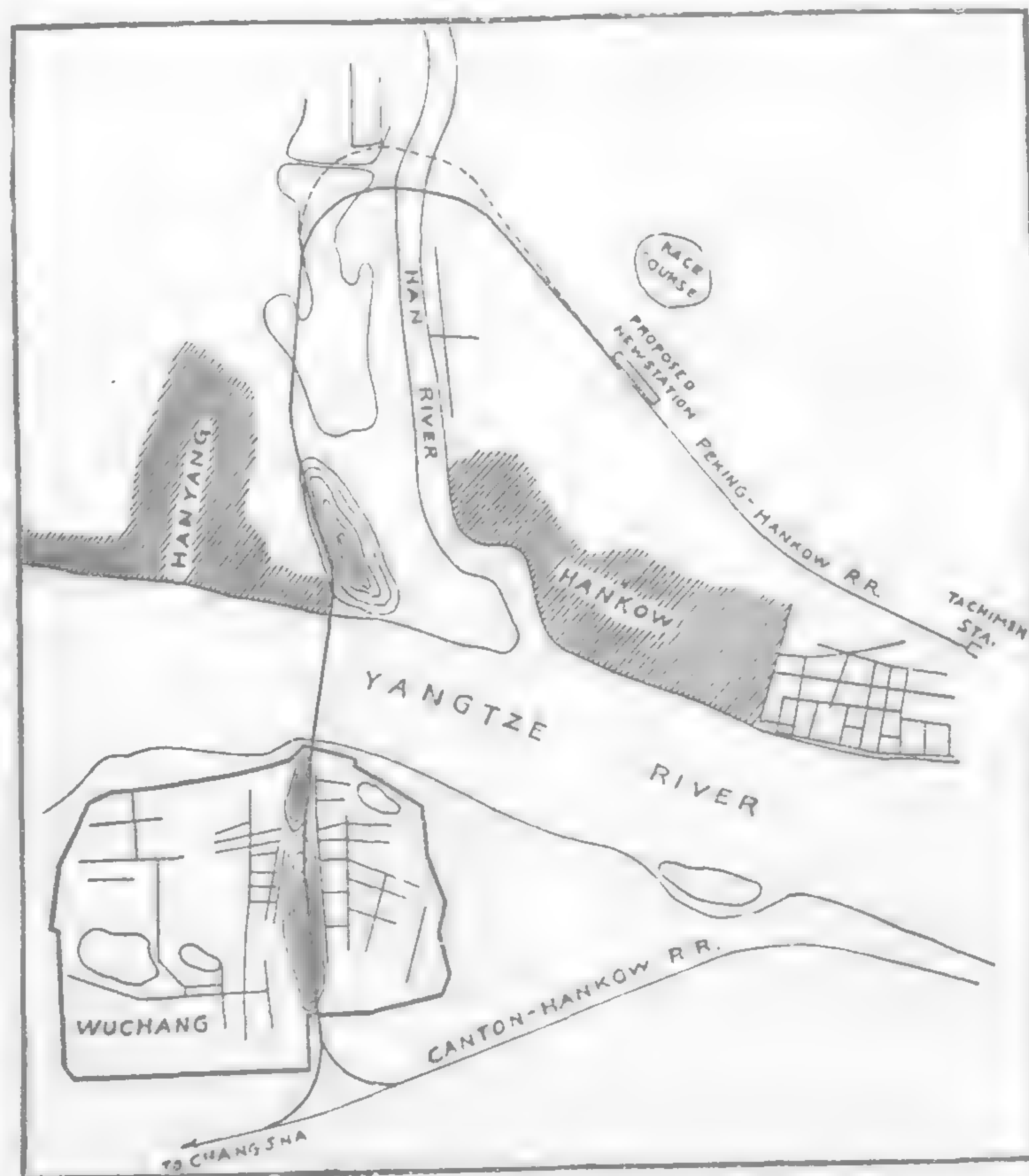
(Ed. note.—The study of the question of bridging the Yangtze river was made by Dr. Waddell at the request of the Chinese government early in the fall of 1921. The "Commission for the New Bridge over the Yellow River" for which Dr. Waddell had come from America was dissolved at the end of August, and the minister of communications requested Dr. Waddell to remain a few weeks longer for the study of China's major bridge problems, the bridging of the Yangtze

more than two million inhabitants and, except for an irregular ferry service and a sampan traffic, are isolated while on many occasions storms close the river communication. The industries in Hankow have developed tremendously during recent years, and real estate has risen beyond all proportion to the surrounding territory. The planned bridges would greatly enhance land values in both Nanyang and Wuchang and would permit an enormous expansion.



river at Hankow and at Nanking. These two crossings were carefully studied by Dr. Waddell and the preliminary plans for bridges were made along with estimates of cost. The investigation occupied several weeks and was accomplished with the assistance of the Peking-Hankow line engineers, at Hankow, and, at Nanking, with the help of engineers detailed from the Tientsin-Pukow line.

The report which follows concerns the bridging of the Yangtze at Hankow and includes the plans for two bridges, one across the Han river from Hankow to Nanyang, and one across the Yangtze from Nanyang to Wuchang. By this means the three cities, Hankow, Nanyang and Wuchang will be connected and, aside from furnishing a direct link between the Peking-Hankow R. R. and the Hankow-Canton R. R. an important municipal problem will be solved. These three cities have a total of



Proposed Crossings of the Yangtze and Han Rivers

There is at present no system of tramways in any of the three cities. It was planned to make the train service over the bridges an interurban one and later to build gauntleted tracks for tramcars.

The project attracted a large amount of interest among those concerned and, but for the recent disturbances in and about Hankow, might now be in the process of promotion. It is at present considered one of the most logical of the larger engineering problems and the benefits to be derived by the people of Hankow, Nanyang and Wuchang make its ultimate construction practically certain. The plans of Dr. Waddell were made in accordance with his carefully developed system of bridge economics and represent a saving of more than ten millions over previous estimates.—(Journal of the Association of Chinese and American Engineers).

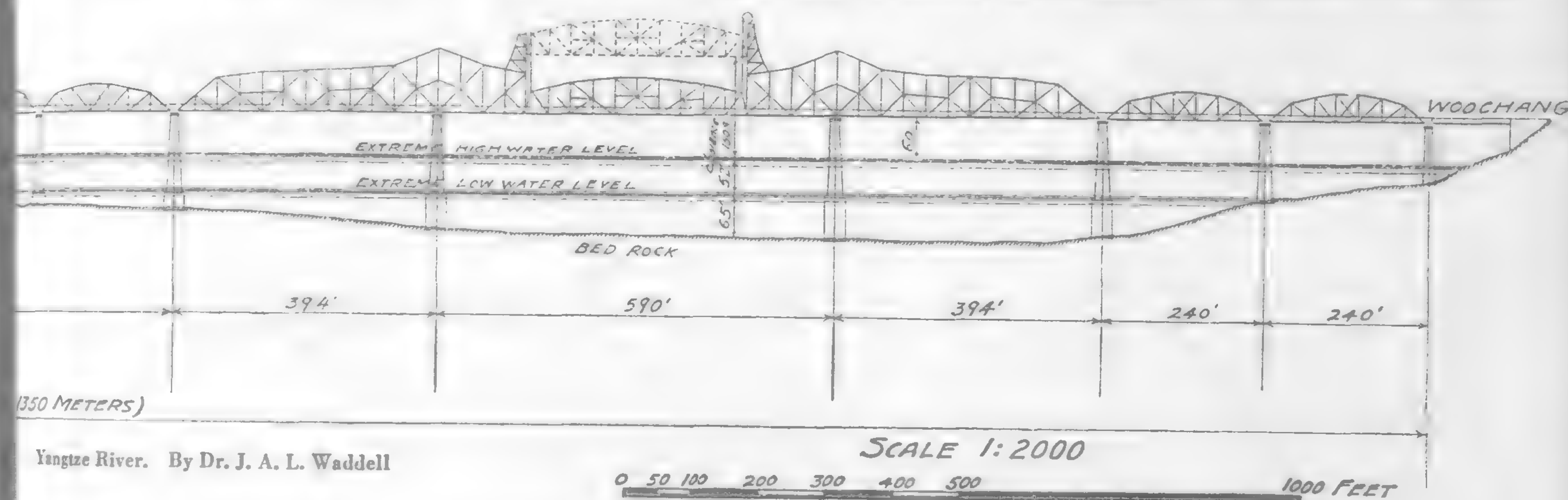
Peking, October 26th, 1921.

TO HIS EXCELLENCY,
The Minister of Communications,
Peking.
YOUR EXCELLENCY,

In compliance with official instructions, I have made a thorough study of the river, railroad and highway conditions at and near the junction of the Han and the Yangtze rivers, with the view of connecting the northern and the southern railway systems of China and of providing highway and (later on) electric railway accommodations between the cities of Hankow, Han Yang and Wu Chang. The project involves the crossing of both the Yangtze and the Han rivers by "combined" bridges to carry steam-railway, electric-railway, vehicular and pedestrian traffics.

SITES.

Before starting for Hankow I was informed that there was a choice in the location of the Yangtze crossing, viz., either above or below the mouth of the Han; but I soon saw that the lower



crossing should not be considered, as that would eliminate entirely the city of Han Yang, unless there were built an additional crossing of the Han to connect Hankow and Han Yang. Such a combination would not connect Han Yang and Wu Chang, except by passing through Hankow.

As this combination of bridges would cost somewhat more than that of the two bridges above the junction, and as the communications between the three cities should be made as direct and intimate as possible, I decided upon the upper site for the Yangtze structure. Moreover, this route provides the shortest possible main structure for the crossing of the larger river. The location is almost identical with the one previously selected in 1911 by the civil engineering class of the Peking government university when making a study entitled "Ideas and Proposals for a Highway and Railroad Bridge Across the Yangtze between Han Yang and Wu Chang."

In respect to the location of the proposed Han River bridge, I selected two sites, one for a high-level crossing by the railway and one farther down stream for a low-level crossing.

The three sites above mentioned are shown on Sheet No. 1 of the accompanying drawings.

SOURCE OF INFORMATION.

In addition to the pamphlet published by the civil engineering class before mentioned, I obtained through the courtesy of Mr. L. C. Kwong of the Kin-Han Railway a large-scale municipal map of the three cities and a large-scale railroad map of Hankow and some of the adjoining territory across the Han river, included in the exterior portion of the city of Han Yang.

A comparison of the widths of crossing of the Yangtze as given on the municipal map and as shown in the pamphlet just mentioned, indicated a discrepancy of some 220 metres. Consequently I had Mr. Kwong send a small party of engineers to make a triangulation of the river. The result checked the pamphlet within thirty metres, and showed an error of some two hundred and fifty metres on the map. This is probably due to the fact that the said map was printed in two parts that were afterwards pasted together, the junction being at about the middle of the river.

In making a portion of the map on Sheet No. 1 of the accompanying drawings I utilized the erring map by assuming that the two halves had been brought too close together during the pasting; and in Sheet No. 2 thereof the profile is the same as that given in the pamphlet, excepting only that the width of the river has been increased some thirty metres. The location of the bed-rock given in the pamphlet, I assumed to be correct, because several persons in Hankow informed me that, in making soundings at high stages of water, the sounding-weight indicated by the feel that rock was being struck. Not having available any apparatus nor the necessary time for checking the correctness of this conclusion, I was forced

to assume it as being true, and to use it in the preparation of my estimate of total cost of structure for the proposed crossing. Of course, before taking any steps towards the building of the bridge, proper borings to and into bed-rock should be made at a low-stage of water. If any error be then discovered, my figures would have to be corrected accordingly.

In respect to the location of bed-rock for the Han river crossing, I could obtain no information whatsoever, Mr. Kwong was of the opinion that there is none within reach, and that, consequently, pile foundations would have to be adopted; but I judge that such is not the case. In my calculations of cost I assume that bed-rock will be found at a depth of fifty feet below extreme low water. If this assumption be incorrect, no great error in the total cost will be involved, provided that a satisfactory pile-resistance be found without calling for exceedingly long piles.

RECONNAISSANCE.

In company with Mr. Wang and Mr. Kwong, engineers of the Kin-Han line, I made a reconnaissance, partly by jinrikisha and partly on foot, of a line to connect the Kin-Han road on the north with the Canton-Hankow road on the south. This route is indicated on Sheet No. 1. It is quite satisfactory; but I should advise draining completely the large lake between the two rivers and dyking against over-flow at high-water stages before building an embankment there. It is true that this would call for a small pumping plant to remove at high-water stages the water that might otherwise accumulate through either rainfall or seepage, or both combined; but the cost would be warranted by the great value of the land thus reclaimed. At first it could be utilized for

agricultural purposes (and as such would be found exceedingly rich and suitable for market gardening); but later it would be needed for the expansion of the cities of Hankow and Han Yang, both of which are now greatly congested. Again, the land between the two rivers will ere long be needed for the establishment of important industries.

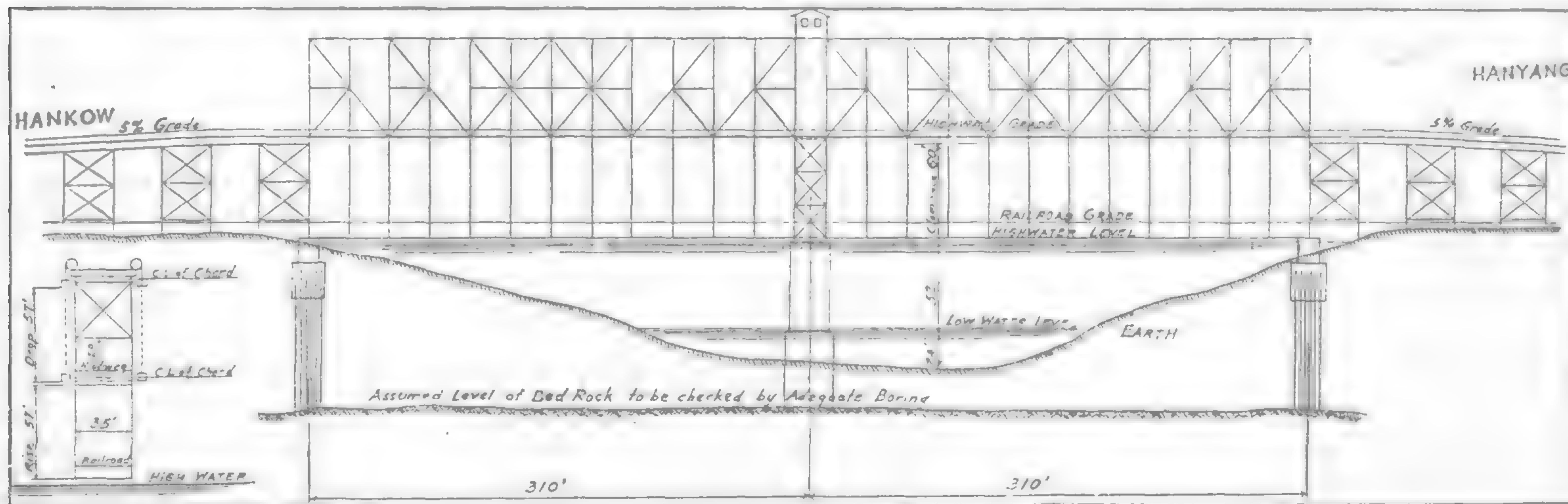
It was not necessary for me to walk over the Wu Chang approach of the steam-railway; because, by standing at the summit of the high hill near the river, I could determine the entire route thereof. I saw that by utilizing the steep sides of two long hills, running at about right angles to the direction of the river, an excellent line with easy grade could be located, and that no buildings of any importance need be damaged.

At first I figured upon a high-level crossing of the Han river; but, owing to the location of a proposed union depot, which, for good and sufficient reasons, could not be changed, there would have been necessitated a grade of one and a quarter (1.25) per cent., in order to provide the necessary clearance for passing junks. Later, however, I decided that it would be far better and cheaper to adopt a double-deck structure, having the highway above and the steam-railway below with the grade very close to the extreme-high-water elevation, the railway deck being suspended from the over-head trusses by telescoping hangars, according to the method that I evolved and utilized a dozen years ago when building the Fratt bridge across the Missouri river at Kansas city. This

as to cause too much interference, a high-level railroad-bridge could be built so as to divide the railroad traffic between the two structures and thus halve the said interference.

RIVER CONDITIONS.

The amount of junk traffic on both rivers is immense, and numerous craft are constantly moving both up and down stream. On the narrow Han river this is specially noticeable; and it is said that at times one experiences great difficulty there in passing by launch through the mass of vessels that extend from bank to bank. On this account I have deemed it to be both right and economic to allow, between high-water shore-lines in both bridges, a vertical clearance, above extreme high-water elevation, ample for passing the masts of the tallest junks in the district. From personal observation and by enquiry I have set this clearance at sixty (60) feet, but I did not have time to measure the heights of any masts. This assumption is sufficient for the preparation of a preliminary estimate of cost; but, before determining finally upon the layouts of structure preparatory to building, the matter should receive thorough investigation. An increase of a few feet in the clearance would augment the total cost only slightly, because the railroad approaches of the Yangtze bridge run into side-hills at each end at a short distance from the river bank, which distance would not be any greater, were the elevation of grade made a little higher. The larger cost would be mainly due to the taller piers of the bridge and the longer highway approaches. In the



Proposed Railway and Highway Bridge Across the Han River;
By Dr. J. A. L. Weddell

structure is described at length on pages 723 and 728, inclusive, of my treatise on "Bridge Engineering."

The advantages of the low-level railway-crossing of the Han over the high-level crossing are as follows:

First. There is a saving of at least \$2,500,000, in the first cost, owing to the entire avoidance of expensive steel trestles.

Second. The cost of operation is much less, due to the saving of some fifty-five feet of climbing.

Third. The total length of the connecting railroad between the north and the south systems is some 7,000 feet shorter by the low-level route, thus saving, by reason of reduced length alone, something in both first cost and operation.

On the other hand, though, there are the following disadvantages:

First. The low-level crossing will interfere a little with the passage of junks, and this interference will increase as the railroad traffic augments, although probably not at all seriously.

Second. The stopping of trains to allow for the lowering of the deck would cause a small loss of time in railroad operation, although by no means as much as that involved by the fifty-five foot extra-climb before mentioned.

On the whole, the advantages of the low-level route greatly outweigh the disadvantages; and if, in the dim and distant future, the river traffic and the railroad traffic should increase so greatly

case of the Han river bridge, the railroad grade being close to high-water elevation, the railroad approaches would not be at all affected by the higher clearance.

It has been suggested to me that it is feasible in China to compel all junks to take down their masts when passing beneath bridges, as is the case on the Yellow river structures, where the amount of water-traffic passing is small; but on a great internal highway like the Yangtze and upon such a congested stream as the Han, to necessitate the lowering of masts would be an inexcusable hardship to inflict on navigation.

As for the passing of ocean-going vessels with their tall masts at the proposed Yangtze crossing, you will see from Sheet No. 2 that I have provided a vertical-lift span of three hundred and twenty-six (326) feet with a vertical clearance of one hundred and fifty (150) feet, which clearance could be increased, if necessary, at very small expense.

There is a condition of some importance affecting the layout of spans, viz., that large rafts of timber are floated down river. They are both long and wide; and, while it might not be economic to increase greatly the cost of structure so as to accommodate their passage between the piers, it is only proper that the rights of the owners of rafts should be given due consideration. With the layout I have adopted, the smaller rafts could pass anywhere, the least horizontal clearance between piers being a little more

than two hundred feet; but the larger rafts would have to be so steered as to go under one of the three longer spans. The horizontal clearance of the main opening, being over five hundred and fifty feet, ought to give ample facility for the passage of the largest of such rafts, provided it be properly navigated.

LAYOUTS.

As can be seen by reference to sheet No. 2, the layout for the proposed Yangtze crossing, starting from the Wu Chang side, consists of two through simple-truss spans, each 240 feet, an anchor arm of 394 feet, a cantilever span of 590 feet, an anchor arm of 394 feet, and eight through, simple-truss spans of 240 feet each, all measurements being taken from centre to centre of piers. This layout practically covers the entire river between high-water shore-lines.

The layout for the proposed Han river crossing consists of two simple truss spans with parallel chords, carrying a suspended deck for the double-track railway, as shown on Sheet No. 3.

TRAFFIC PROVISIONS.

The question of double-track *versus* single-track for the two structures is one to which I have given considerable thought. In America the question would not have arisen; for experience has taught American railroad engineers that it is always truly economic in the case of a long and expensive proposed railroad bridge to provide for a double-track, because eventually it certainly will be needed. Here, however, where money for big enterprises is scarce, I felt that the point should not be decided without full deliberation.

In view of the fact that the length of the Yangtze bridge and its steel approaches is about a mile, if this length were to be of single track and later both the north and the south trunk lines were to be double-tracked (as undoubtedly they will be some day), the volume of traffic would be far too greatly restricted. It is true that there might be adopted an expedient I evolved and patented in the U. S. A. many years ago, by which the piers are built for double-track, as are also the cross-girders of the superstructure, two of the four lines of stringers being temporarily omitted, the trusses being strong enough for single-track only, and provision being made for building duplicate trusses alongside and so connecting the old and the new ones as to make them divide the total load equally between them.

Were the structure to be a railway bridge pure and simple, such an arrangement might save temporarily a considerable amount in first cost and a large sum of money in interest charge; but as highway traffic has to be taken care of at once, this expedient is really not feasible.

For the Yangtze crossing I have, therefore, adopted a cross-section, as shown on Sheet No. 2, having the double-track steam-railway between the trusses with an eighteen-foot roadway on each side, exterior thereto, and an eight-foot sidewalk outside of each roadway. The traffic on each roadway is to be in one direction only; and this restriction will apply to the sidewalks also.

At present there are no electric tramways in any of the three cities, but the time is coming when there will be; and it will then be highly advisable to connect the tram lines of the three cities. This could be done by building separate approaches to each bridge for the said tram lines, and by running them between the trusses on gauntleted tracks. This expedient obviates the necessity for any switching or any blocking system between the steam railway and the electric line.

I have laid out both structures and their approaches so that there would be no intersection at grade of any two kinds of traffic—an arrangement that not only increases materially the capacity of the bridges but also reduces to zero the possibility of accident from intersecting traffic.

Pedestrians are to be admitted to and taken from each bridge by stairways located near the high-water shore lines; and they should never be allowed to enter the highway-traffic road-ways. Jinrikisha men and those hauling carts, of course, should not be

considered as pedestrians, but should be compelled to use the said roadways.

Ramps with grades not to exceed eight per cent. might be substituted for the stairways; but, whichever type of pedestrian approach be adopted, landings or resting place should be provided.

On sheet No. 3 is shown a cross-section of the Han river bridge, indicating that the highway traffic is carried at the upper level between the trusses and the sidewalks at the outside thereof, and that the railway traffic is cared for at the lower level by a steel floor-system suspended by telescoping hangars from the truss above. For the purpose of reducing to a minimum the total weight to be lifted by the electric machinery, the said floor-system should be manufactured of some high alloy of steel, such as nickel steel.

GRADES.

In my opinion, the greatest allowable grades should be one per cent. for the steam-railway, five per cent. for the highways, and from five to seven per cent. for the electric tram-lines. The proper limit for the latter will depend upon a number of conditions; but any grade between these figures would be fairly economical in respect to both first cost and operation.

LIVE LOADS.

For these structures I advocate the adoption of the following live loads as given in "Bridge Engineering":—

Steam railway	..	..	..	..	..	Class 60
Electric railway	..	..	..	..	..	Class 25
Highways (Floor system)	..	..	..	..	..	Class B
(Trusses)	..	..	..	..	..	Class C
Footwalks	..	..	..	..	..	Class C

SPECIFICATIONS.

For designing the substructure and the superstructure of these bridges I am of the opinion that it would be best to adopt the specifications, principles, and methods given in my "Bridge Engineering," but if, for any reason, the superstructure specifications of the American railway engineering association be preferred, there could be no valid objection to their adoption.

MATERIALS.

I have figured on employing carbon steel for the entire superstructure; but later on it may be found more economical to employ nickel steel or some other high alloy of steel instead, especially for the moving span of the Yangtze river bridge and for the moving deck of the Han river structure.

For the railway floor I assumed the American standard practice of employing creosoted wooden ties and guard-rails with a narrow plank footwalk on each side for the use of employees only, the spaces between the ties not to exceed five inches.

For the highway floors I have adopted creosoted-block pavement four inches thick, supported on reinforced-concrete slabs about seven inches thick. In order to reduce the weight of this case to a minimum, I have estimated upon employing Haydite concrete, which effects a saving of some fifty pounds per cubic foot, as compared with ordinary concrete.

For the footwalks I have adopted four-inch slabs of reinforced Haydite concrete.

For the shafts of piers I have figured on using plain concrete, excepting that the copings thereof should be of dressed granite. As there is no ice in the river, there is no need for using granite facing for any portion of the piers.

For the bases of the piers sunk in deep water, I have estimated upon using timber shells filled with concrete up to an elevation of four feet below extreme low water; but for those sunk in shallow water or on a sandbar, I have adopted reinforced concrete for the shells, in order to avoid the employment of timber, which at Hankow would be quite expensive. It is necessary to adopt it for the deep-water piers, in order that the caissons may easily be floated into place.

METHODS OF CONSTRUCTION.

As all piers will reach bed-rock, at a depth not exceeding seventy feet at low water, I have adopted the pneumatic process throughout. It will be necessary to put down the caissons at comparatively low stages of water, although, after the sinking of a caisson is well started, it will be practicable to continue it, provided that the head of water does not exceed one hundred and fifteen feet.

Erection of spans should be done at comparatively high water by the method of flotation. The conditions for this at Hankow are quite favorable. I have employed the method extensively in my American practice on such rivers as the Fraser, the Willamette and the Columbia on the Pacific coast, and am figuring on so doing for the proposed Mississippi river bridge near New Orleans.

UNIT PRICES OF MATERIALS.

In determining the unit prices of materials in place I have used much deliberation; because, while I do not want to make the total cost so high as to discourage building, I cannot risk my hardly-earned reputation as a safe estimator by adopting figures that are lower than those which it would be found necessary to pay when letting the contract for construction. I made careful enquiries as to the cost of timber, piling, sand, brokenstone, granite masonry, cement, common labor, skilled labor, etc., at Hankow; and I guessed that the probable cost per pound for carbon steelwork delivered at Hankow would not exceed 4.25 cents gold, allowing for erection and profit thereon 2.0 cents per pound gold, making 6.25 cents gold erected, which is now equivalent to 11 cents Mex.

In proof of the correctness of this surmise I would state that a few days ago I received a letter from my New York office containing the information that it had just let the contract for a steel bridge at Trenton, New Jersey, at 4.6 cents per pound erected. Allowing one cent gold per pound for freight and 0.5 cent gold per pound for extra cost of erection at Hankow would bring the total to 6.1 cents gold, which is a trifle under the 6.25 cents that I had assumed.

For the average cost per pound of the machinery and wire ropes for the vertical lift, I had assumed 50 cents Mex.; and I am informed that at the before-mentioned Trenton-bridge letting, which structure will include a vertical lift span, the pound prices in gold that were tendered ranged from 15 to 20 cents for the main sheaves and from 22 to 30 cents for the operating machinery, equalizers and ropes. An average of these figures is 22 cents gold, which is now equivalent to 38.5 cents Mex., proving that my allowance was ample.

ESTIMATED QUANTITIES OF MATERIALS.

Upon the assumed profits of bedrock I have estimated carefully in detail, and have checked the quantities of copings, shafts, and bases of all piers, and those of all materials entering into the flooring of the superstructure. As for the weights of metal, I took them from the diagram on page 155 of my "Economics of Bridgework," which diagram was prepared from the estimated weights of carbon steel for various span lengths in my before-mentioned proposed Mississippi river bridge near New Orleans, the carrying capacity of which is exactly the same as that assumed for the proposed Yangtze and Han structures.

I am offering these statements in order to give you confidence in respect to the correctness of my estimates of cost, fearing that the remark made by my British colleague at a general board meeting of the Yellow river bridge commission may have reached your ears and prejudiced your judgment of my estimates. He stated that my estimates of cost for an economically designed bridge to cross the Yellow river would have to be greatly increased; because engineers' estimates were always too low, his own often having been exceeded by as much as one hundred per cent. My reply was that if my estimates of cost should be over-run by even a small portion of that percentage, I would soon be entirely out of work.

In America engineers must figure closely; and my estimates are

very seldom over-run, and then only slightly. For instance, the last estimate I made before leaving New York was for the superstructure of a bridge consisting of three spans of three hundred feet each, the middle one being a vertical-lift span. My estimate of total cost was \$620,000, and the lowest bid (which took the contract) was \$619,000.

In the case of the before-mentioned Trenton bridge, let last month upon a falling market, the contract was awarded for a sum materially below our estimate of cost.

Estimates of Total Cost

My estimates of cost are as follows :
YANGTZE RIVER BRIDGE.
SUBSTRUCTURE.

Copings 582 cu. yds.	.. .. . @ \$ 40 =	\$ 23,280
Shafts 48,568 cu. yds.	.. .. . @ \$ 17 =	825,565
Bases with concrete shells 5,000 cu. yds.	.. @ \$ 33 =	165,000
Bases with timber shells 15,326 cu. yds.	@ \$ 42 =	643,692
Total cost of substructure		\$1,675,628
Ordinary structural carbon steel, 51,450,000-lbs.		
@ 11 cents		\$5,659,500
Machinery and ropes, 280,000-lbs. @ 50 cents ..		140,000
Flooring, 3,770 lin. ft. @ \$ 120		450,000
Counterweights, 1,030 cu. yds. @ \$ 25		25,750
Electrical apparatus and house		44,000
Total cost of superstructure		\$6,319,250

RAILWAY APPROACHES.

Steel, 4,400,000-lbs. @ 10 cents	\$440,000
Flooring and pedestals, 1,750-ft. @ \$30	52,500

Total cost of railway approaches	\$492,500
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HIGHWAY APPROACHES.

Steel, 1,800,000-lbs. @ 10 cents	\$180,000
Flooring, 1,750 lin. ft. @ \$ 70	122,500
Stairways	22,500

Total cost of highway approaches	\$325,000
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GRAND TOTAL.

Substructure of bridge	\$1,657,628
Superstructure of bridge	6,319,250
Railway approaches	492,500
Highway approaches	325,000

Summation	\$8,794,378
Engineering and contingencies, 10%	879,438

Total cost of Yangtze bridge and approaches ..	\$9,673,816
Say	9,700,000

HAN RIVER STRUCTURE.

SUBSTRUCTURE.

Shafts, 2,100 cu. yds. @ \$ 17	\$ 35,700
Bases, 3, 530 cu. yds. @ \$ 33	116,490

Total cost of substructure	\$152,190
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SUPERSTRUCTURE AND TOWERS.

Ordinary carbon steel, 10,600,000-lbs. @ 11 cents	\$1,166,000
Flooring, 640-lin. ft. @ \$ 120	76,800
Machinery and ropes, 448,000-lbs. @ 50 cents ..	224,000
Counterweights 640 cu. yds. @ \$25	16,000
Electric apparatus and house	80,000

Summation	\$1,562,800
HIGHWAY APPROACHES (TO CARRY ALSO ELECTRIC RAILWAY TRUCKS) AND STAIRWAYS	\$560,000

GRAND TOTAL.

Substructure of bridge	\$ 152,190
Superstructure of bridge, and towers	1,562,800
Highway approaches and stairways	560,000
Summation	\$2,274,990
Engineering and contingencies 10%	227,500
Total cost of Han river bridge	\$2,502,490
Say	2,500,000

CONNECTING RAILWAYS.

Double-track railway with small stations, sidings, etc., complete, 5 miles @ \$60,000	\$300,000
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TOTAL COST OF PROJECT.

Yangtze river bridge	\$ 9,700,000
Han river bridge	2,500,000
Connecting railway line	300,000

Grand total cost of project	\$12,500,000
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ECONOMICS.

A study of the preceding estimates of cost might cause one to think that the layout of spans is not economic, because the cost of the superstructure is so much greater than that of the substructure. It is true that the adoption of shorter spans would reduce somewhat the grand total cost of the project; but I believe that it would interfere too much with navigation.

NECESSITY FOR MATERIALIZATION OF PROJECT.

In my opinion, the materialization of this project in its entirety, in the manner in which I have laid it out, is of paramount importance to the Chinese republic. The connection of the two great railroad system would be a link that would bind closely together North and South China, not merely by increasing trade between them, but by facilitating personal intercourse between the two sections of this great country, unhappily at present so divided. It would be a great pity to have the existing division continue indefinitely, for the results thereof would be just as disastrous as would have been those in America, had the attempted segregation of the southern states from the union proved successful.

Again, there are approximately two million inhabitants in the three closely-located cities at the mouth of the Han; and the only present means of communication between them is by water. In stormy weather it is exceedingly difficult, and occasionally totally impracticable, to cross the Yangtze at Wuchang; hence highway-bridge connection between the three cities would be a real boon, and would undoubtedly give a great impetus to the business of the entire district. The existence of the railroad connection would induce the establishment of new manufacturing enterprises in all three of the cities: and the draining of the shallow lake between the two rivers, before referred to, would provide ample space therefor—to say nothing of that which would be available along the banks of the Yangtze both above and below the suggested crossing.

The materialization of this project is as important a matter for the development of China as any that has ever been suggested; and patriotic Chinese capitalists would do well to give it immediate and serious consideration.

SUGGESTED METHOD OF FINANCING.

I am of the opinion that, as soon as the present upset condition of the financial world has changed for the better, it would be practicable to procure from American bankers the money needed for building the two bridges and the connection railroads. It would be necessary, though, for the Chinese government to guarantee the ultimate payment of both principal and interest, and to allow the bond-holders to operate the structures and collect the tolls until the debt is cancelled, the said tolls being applied to the payment of interest and to the refunding of the principal.

The highway travel over the bridges would be immense, were reasonable tolls adopted; and there should be a charge made for every loaded or unloaded car carried across by the railroads.

At present there should be considerable freight for the north from the territory traversed by the Hupei-Hunan section of the Canton-Hankow line; and as soon as the existing gap is completed, the amount of both freight and passenger rail-traffic over the bridge would be enormous.

Later on I might be able to be of service in securing American capital for this enterprise; and, if so, it would give me great pleasure and satisfaction to aid the Chinese government in that manner.

CONCLUSION.

In conclusion, permit me to offer the suggestion that this report be given to the Chinese institute of engineers and to the association of Chinese and American engineers for publication in their proceedings, from which it would undoubtedly be copied largely both at home and abroad, thus bringing the project to the attention of the financial world.

Trusting that this work which I am herewith completing will meet with your excellency's approval.

I remain, with great respect,

Yours faithfully,

(Sgd.) J. A. L. WADDELL,

Consulting Engineer.

New Sino-Japanese Loans

IT is reported that Mr. Chang Chien, who is a leading business man in Nantungchow, an industrial town in the mid-eastern part of China, and who was formerly the minister of agriculture and commerce, is now interested in a movement for the raising of three private loans in Japan, that is, one for Yen 30,000,000, another for Yen 15,000,000, and a third for Yen 8,000,000, for the purpose of starting land exploitation and irrigation schemes in the south-eastern region of Kiangsu, between Nantungchow and Hweichow, and also for the development of the spinning industry in Nantungchow, in which Mr. Chang is concerned. It is said that three delegates of Mr. Chang are now in Japan and are negotiating with Japanese capitalists belonging to the Japan-China business association through Viscount Shibusawa, and that the Japanese investors are rather favorably inclined to the proposal.

Strangely, however, this proposal is said to be exciting considerable opposition among the Chinese people, and Mr. Chang is reported to be having a difficult time in explaining his position to them. We are puzzled to understand why the Chinese people are opposed to the idea, unless it is merely due to the usual anti-Japanese sentiment. It may be that they fear these loans will lead to the destruction of sovereignty in China, but it is impossible that a purely private and genuinely economic loan for the development of the land, which is bound to result in the promotion of the interests of the local people, should prove dangerous to the sovereignty of the country. On the contrary, history most clearly shows the tremendous public benefit, which similar loans have brought to the people of China, as in the case of the Wei Ho conservancy loan, which was signed in April, 1916. This loan, at first, originated from the importation of \$20,000,000 gold from America on the security of the land revenue, the river-improvement tax, and the canal transit duty in the province of Kiangsu, as the result of negotiations between Mr. Chang and Dr. Reinsch, American minister to China, who at the time was a representative of the American red cross society. Later the Siems-Carey Railway & Canal Company of America and the Industrial Bank of Japan jointly invested \$6,000,000. So far as our knowledge goes, this has so far not affected the sovereignty of China in the least, nor can it ever do so in the future.—Osaka Mainichi.



Siam State Railways: A Station on the Southern Line

Siam State Railways' Building Program

CONSTRUCTION work which will make it possible to travel from Bangkok to some of the most remote parts of the kingdom of Siam is now being carried on by the Siam State Railways. It is hoped that within the near future it will be possible to travel from Penang

and Singapore through Siam to the principal cities on the French system in Indo-China without the change of cars. A ten-year program outlined by the railways includes (1) the conversion of the northern, north-eastern and eastern lines from standard to metre gauge, in order to be uniform with the gauge adopted by the neighboring countries and of the Siamese southern line, (2) the linking up of the systems on the east and west banks of the Menam Chao Phya by a bridge across the Menam, (3) the extension of the eastern line from Petriew to Aranya Pradesa, 5.9 kilometres from the Cambodian boundary, and (4) the extension of the north-eastern line from Korat (Nakorn Rajasima) to Ubol, a city not far away from the Mehkhong river.

The move to make the entire Siamese system into a metre gauge railway has for its purpose the ultimate union of the various railways throughout south-eastern Asia. The F.M.S., French Indo-China and Burma railways are all of the metre gauge and by making the Siamese lines conform, Siam will weld an important link in the chain of railways which in time will carry the traveler from Singapore via Bangkok and Hanoi to Yunnan, and from Mandalay via Rangoon and Moulmein to Saigon.

The southern line, from Bangkok Noi to Padang Besar and Sungei Golok the stations on the borders of Kedah and Kelantan respectively and the system east of the Menam were originally separate railways, and were not united until July, 1917, when they were put under the administration of the present Commissioner General, H.R.H. Purachattra, the prince of Kambaeng Bejra. The standard gauge lines composed the first railways, and were started in 1892 with the building of a line from Bangkok to Ayudhya

(71 kilos.) completed in 1897. The last piece of standard gauge track to be laid was the section from Pang Yang to Chiangmai, which, on January 1st, 1922, was opened to traffic, completing the line of 756 kilometres from Bangkok north. The total length of standard gauge lines is 1025 kilometres. In the year ending March 31st, 1921, the standard gauge lines yielded a net profit of Tcs. 2,735,575, a return of 4.51 per cent. on the investment of Tcs. 60,602,610. The gross receipts for the year were Tcs. 5,787,090.

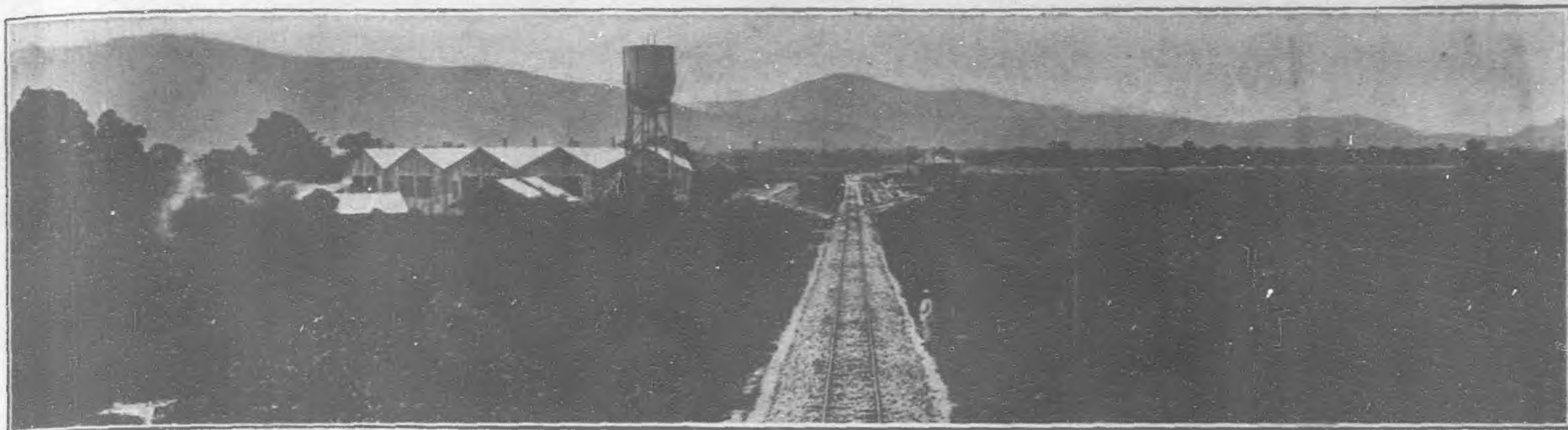
The southern lines were projected in 1909 and a second railway department organized to build and administer the metre gauge railways down to peninsula. Through service between Bangkok and Penang was first started in 1918, three days being required for the trip. On January 1st, 1922, day and night coach and restaurant car service was introduced on this line, and the weekly express now makes the trip in 34 hours. In 1920-21 the southern lines earned a net profit of Tcs. 1,285,187, a return of 1.99 per cent. on the investment of Tcs. 64,453,190.

The decision to unify the gauge of the two parts of the system was made on the 8th September, 1919. The conversion of the standard gauge lines to metre gauge is being accomplished by laying a third rail between the existing rails, the outer rail will eventually be taken up. A set of double points and crossings with suitable switches was designed by the engineers of the technical office of the department of state railways, and practical trials made. The actual work of laying the third rail on the eastern and river lines was begun November 20th, 1920. The conversion of the eastern and north-eastern lines is now completed, and metre gauge rolling stock is used from Bangkok to Petriew and from Bangkok to Korat.

The extension from Petriew to Aranya Pradesa at the Cambodian border has been completely surveyed, and will have a total length of 193.2 kilometres. The line has been cleared and earthwork completed on the first section of 99 kilometres. On the remaining



A Completed Section of the Southern Line



Ootahao Station, Southern Line

section on account of the scarcity of labor it has been decided to carry out construction by machinery, thus doing away with the large manual labor required and reducing sickness and mortality among the laborers working in an unhealthy district to a minimum. At present a large number of the most up-to-date machines have been imported from America for this work. Up March to 31st, 1921, Tcs. 3,965,042.34 had been expended on this extension. The estimated cost when completed is Tcs. 13,542,672.

Aranya Pradesa will for the present be the terminus of a first-class motor road to the world famous Angkor Wat and via Pnom-Penh, the capital of Cambodia, to Saigon.

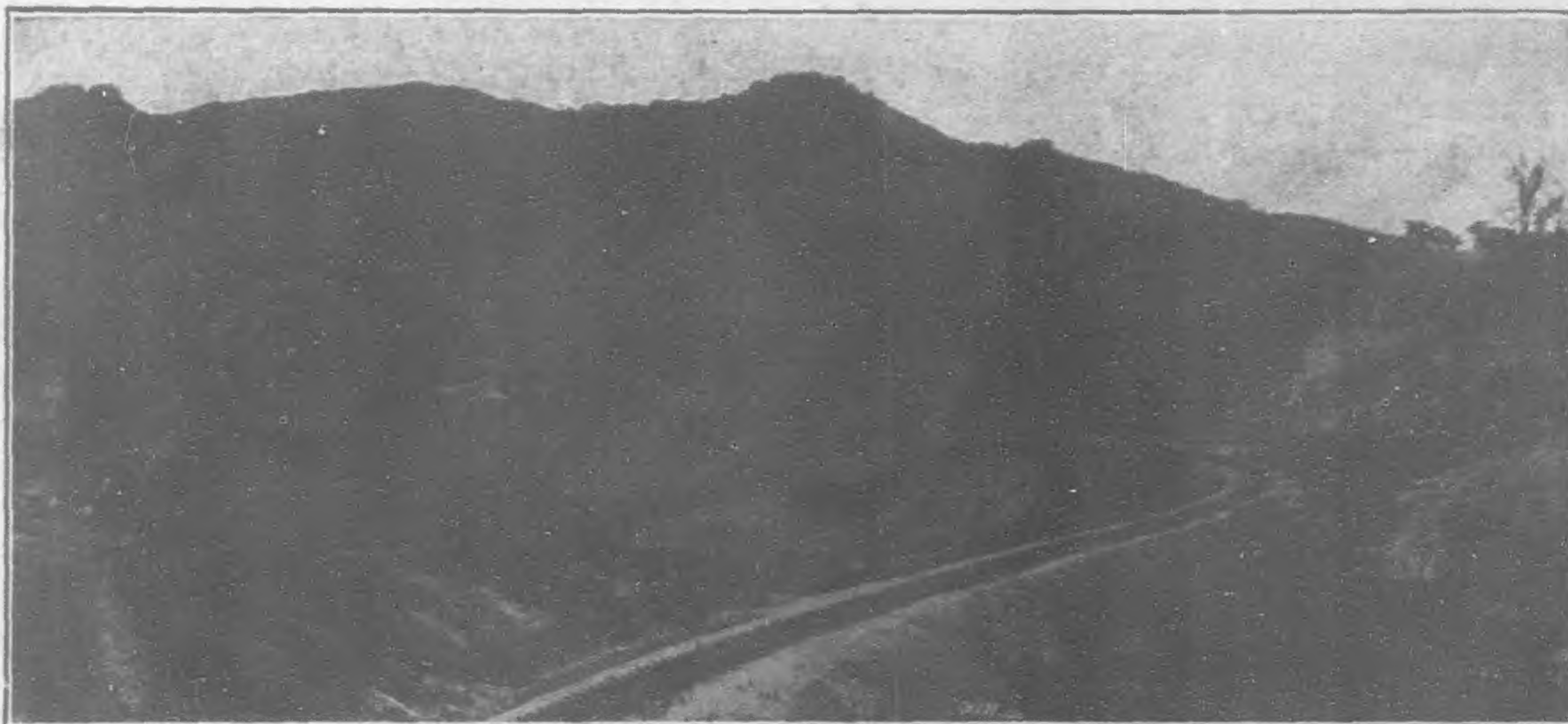
The survey of the north-eastern line extension from Korat (Nakorn Rajasima) to Ubol shows the total length to be 312 kilometres. A section of 147.95 kilometres has been cleared and earthwork on this section was on the point of completion. The expenditure to the end of March, 1921 was Tcs. 734,770.18.

The contract for the bridge across the River Menam was awarded to the firm Daydé of Paris, who constructed the Pont Doumer over the Red river in Tongkin.

The east branch of the southern line, from Haad Yai to Sungei Golok, connecting with the east coast line of the F.M.S. railways and giving through service to Hhota Bahru in Kelantan, was opened for traffic in November 1921. The length of this

branch is 210 kilometres and cost Tcs. 11,473,704 to build. This line will in the future be the alternative route to Singapore.

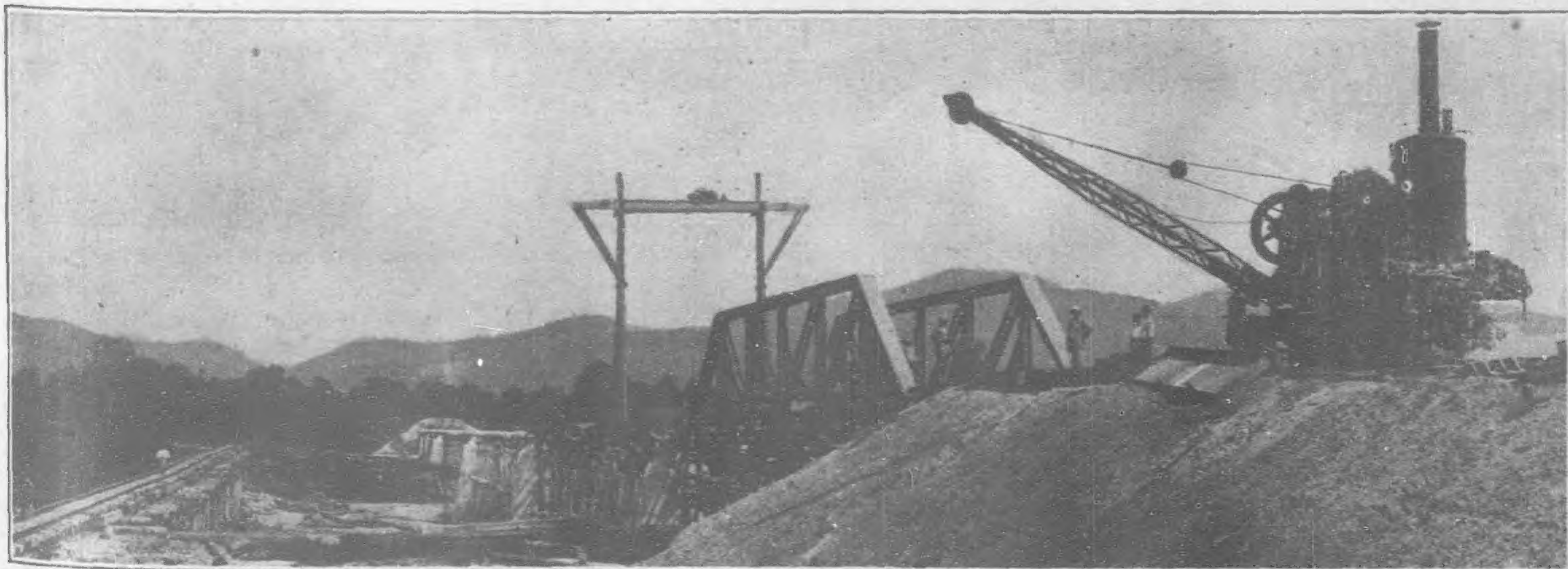
Arrangements have been made to open through service on the northern line this November. At present the journey from Bangkok to Chiangmai is made in three stages, passengers being required to spend two nights in railway resthouses *en route*. When



The Northern Line under Construction

sleeping and restaurant cars are placed on this run, the continuous running time will be reduced to 26 hours.

Since 1918 the administration of the rural highways has been placed under the commissioner general of railways. This arrangement allows for a consistent scheme of transportation, whereby the road system will be made to supplement the rail and waterways of



Erection of Steel Bridge on the Patani Section of the Southern Line

Siam. Roads are made to act as feeders to the railways at important centres.

The development of road building has not yet reached a standard set, as for instance, by French Indo-China. Outside the cities there are few first-class roads in Siam, principally for want of funds. Although there are 3,676 kilometres of roads under the direct control of the department of ways, only 83 kilometres, the road between Songkhla (Singora) and Sadao, a village near the Kedah border, is ranked as first class.

The department of ways keeps a careful census of traffic on the various roads of the kingdom, and ranks each road according to the traffic it must bear. Upon the class of the road depends the appropriation which will be spent in its maintenance. Whenever traffic on an inferior road increases sufficiently, the road is reclassified and resurfaced with better material.

From the year 1919 to March 31st, 1921, Tcs. 3,515,984 53 had been spent by the department of ways. Of this amount Tcs. 1,233,464.11 was expended in road construction, Tcs. 1,365,365.79 for improvement, and Tcs. 751,604.36 for maintenance.

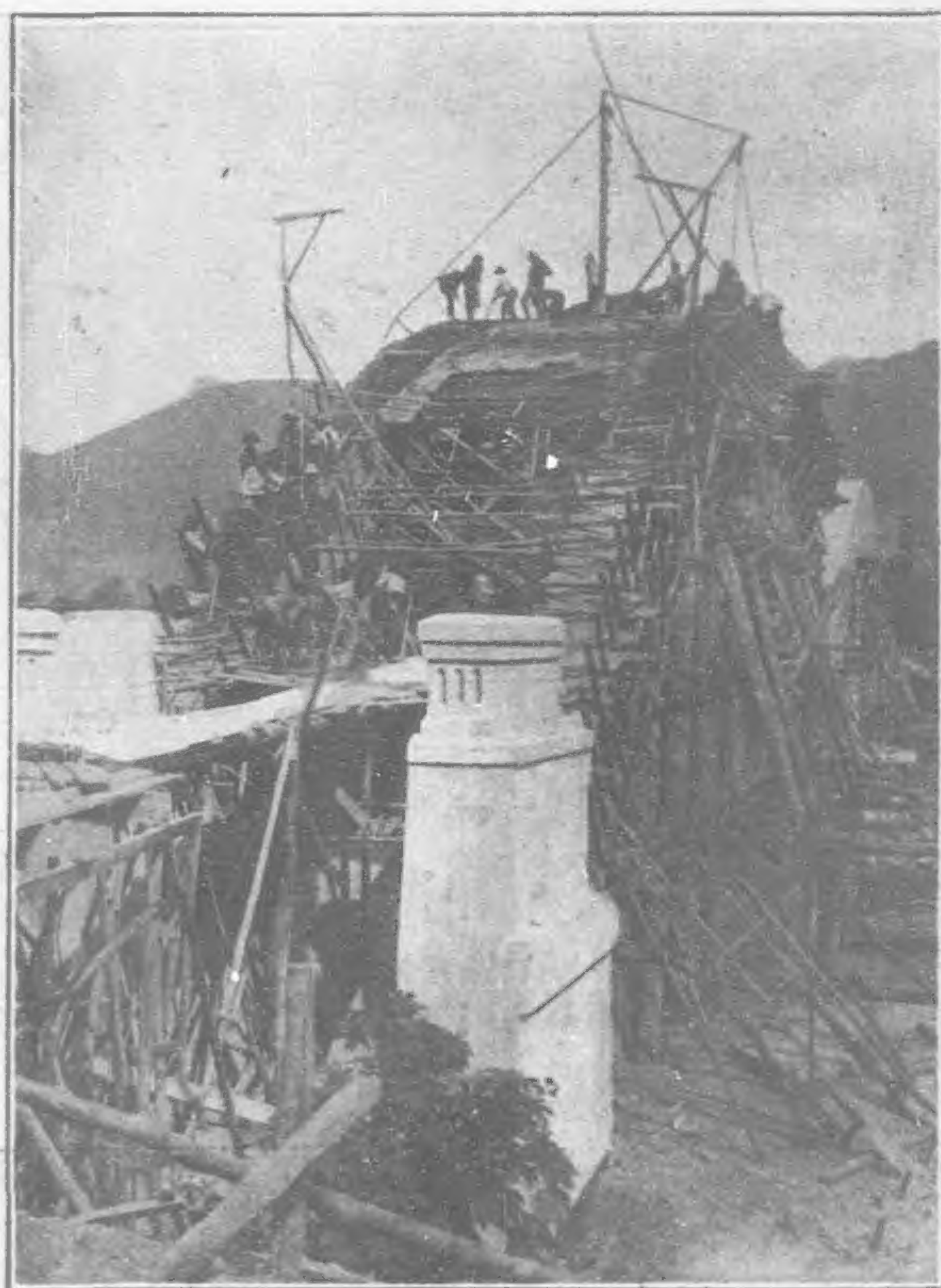
The total length of state roads under the direct control of the department of ways at March 31st, 1921 is analysed in the following table:—

Division				Under Maintenance					Under Improvement					Under Construction					Total per class					Total		
				I	II	III	C.T.	B.P.	I	II	III	C.T.	B.P.	I	II	III	C.T.	B.P.	I	II	III	C.T.	B.P.	Kms.		
Northern	..	..	..	—	57	39	—	—	—	—	45	34	—	—	—	206	39	—	—	57	290	73	—	420
Central	..	..	..	—	—	—	—	—	—	—	—	1,936	—	—	—	47	112	—	—	—	47	2,048	—	2,095
Southern	..	..	..	83	43	30	—	—	—	—	193	400	—	—	14	183	215	—	83	57	406	615	—	1,161
Total B. E. 2463				83	100	69	—	—	—	—	238	2,370	—	—	14	436	366	—	83	114	743	2,736	—	3,676
Total B. E. 2462				—	4	—	—	—	83	96	279	2,370	—	—	—	459	276	—	83	100	738	2,646	—	3,567

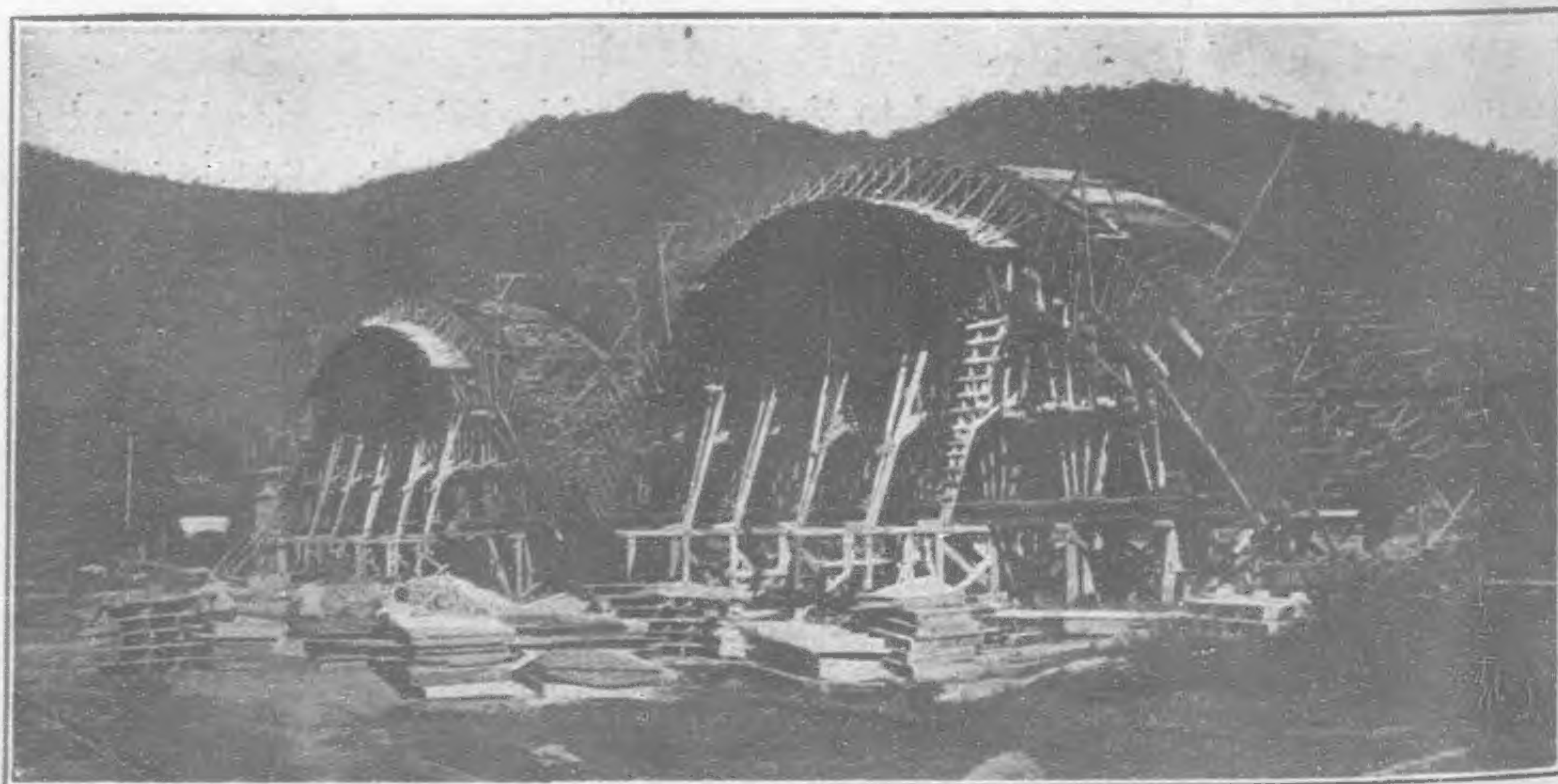
N.B.— I First Class Road
— II Second Class Road
— III Third Class Road

Buddhist Era 2464 is the period from April 1st, 1920 to March 31st, 1921

In all their work as regards the question of transport the Siamese have shown great energy and efficiency and it is hoped that at no distant future the whole kingdom will be covered by a network of roads and railways to cope fully with the requirements of the country, but the lack of funds has been their greatest drawback, hence the full program, which is not given out to the general public, has had to be cut down to utilize only the grant now placed at their disposal.



Another View of Same Bridge



Reinforced Concrete Railway Bridge under Construction in Northern Siam

Siam Railway Orders

The tender of the Cravens Railway Carriage and Wagon Co., Ltd., of Sheffield, represented in Siam by the Anglo-Siam Corporation, Ltd., for the supply of 25 under-frames for railway carriages and 50 bogies and spare parts, has been accepted by the department of state railways. The contract price is £15,309 15s. f.o.b. Middlesbro.

The East Asiatic Co., Ltd., acting on behalf of the Société Anonyme John Cockerill of Belgium, were the successful tenderers for the supply of 11,000 tons of steel rails and accessories, at a price of £112,537 11s. 4d. c.i.f., including handling and stacking on railway premises and demurrage charges for delay of steamers.